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PROCEEDINGS OF THE NATIONAL CONFERENCE ON PESTICIDE CONTAINERS HELD IN NEW ORLEANS, LOUISIANA, 28-30 NOVEMBER 1972

Federal Working Group on Pest Management
Rockville, Maryland

December 1972

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Forty-nine presentations were made under the general headings of: background, requirements and standards for pesticide containers, kinds and numbers of pesticide containers, characteristics of, regulations and legislation encompassing, problems with, innovations, and practices to make containers safer and better. Eleven recomendations for Federal interdepartmental action were made by the Safety Panel.

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Proceedings of the

NATIONAL CONFERENCE ON PESTICIDE CONTAINERS

November 28-30, 1972
New Orleans, Louisiana

Sponsored by
THE FEDERAL WORKING GROUP ON PEST MANAGEMENT

Conducted by
THE SAFETY PANEL

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The opinions expressed herein are solely that of the authors and do not necessarily represent official policies of the representative organizations or the Federal Working Group on Pest Management.

Mention of commercial products or organizations does not imply endorsement by the United States Government.

3<

CONTENTS

RECOMMENDATIONS OF THE SAFETY PANEL TO THE FEDERAL WORKING GROUP ON PEST MANAGEMENT 1

PRESENTATIONS

Section I - Introduction and Background

The Federal Working Group on Pest Management and the Role of Its Safety Panel
Fred H. Tschirley, Chairman, FWGPM 17

Introduction and Charge to the Conference
W. H. Preston, Jr., Chairman, Safety Panel . . . 21

Section II - Requirements and Standards for Pesticide Containers

Considerations by the Safety Panel of the Federal Working Group on Pest Management
L. C. Gibbs, Vice Chairman, Safety Panel 27

Requirements and Standards for Pesticide Containers of Class B Poisons for Transportation
W. J. Burns, Department of Transportation 31

Container Standards - U. S. and International
Vincent Grey, Department of Commerce 37

Section III - Kinds and Numbers of Pesticide Containers

Pesticide Containers Associated With Crop Production
Austin Fox and Herman Delvo, Department of Agriculture 49

Section IV - Characteristics of Pesticide Containers

Closures for Pesticide Containers - I
Haron Wise and Clarence Dearing, American Flange & Manufacturing Co., Inc. 63

Closures for Pesticide Containers - II
Raymond F. Ouer, Rieke Corporation 67

Tank Trucks
Vincent Grey, Department of Commerce. 71

Steel Drums
Arthur W. Nides, Steel Shipping Container Institute 81

Fibre Drum
L. L. Mrkvicka, Continental Can Co., Inc. 93

Paper Containers
C. G. Peterman, Paper Shipping Sack Manufacturers' Association, Inc. 117

Glass Packaging for Pesticides
Leonard Steiner, Kerr Glass Manufacturing Corporation 123

Plastic Containers
John J. Boyle, Consultant and government liaison representative 133

Section V - Regulations and Legislation Encompassing Pesticide Containers

Regulations of the U. S. Department of Transportation as They Pertain to Pesticide Containers
W. J. Burns, Department of Transportation 141

The Poison Prevention Packaging Act
Henry L. Verhulst, Department of Health, Education, and Welfare 147

Military Requirements on Packaging for Transportation of Hazardous Materials
William Jones, Department of Defense. 153

Registration and Regulation of Pesticides with Reference to Containers
Harold G. Alford, Environmental Protection Agency 181

Pesticide Containers and Disposal Systems
William E. Roper, Environmental Protection Agency 185

The Environmental Protection Agency Looks at Accidents and Incidents Related to Containers and Handling
Charles T. Mitchell, Environmental Protection Agency. 191

State Regulations Regarding Pesticide Containers - The East
Charles H. Frommer, New York State Department of Environmental Conservation 195

State Regulations Regarding Pesticide Containers The Midwest Scene
Rollin M. Dennistoun, Minnesota Department of Agriculture 199

State Regulations Regarding Pesticide Containers - California and the West
John C. Hillis, California State Department of Agriculture. 203

Section VI - Problems with Pesticide Containers

Problems With Pesticide Containers As Seen By Chemical Companies
R. F. Uncles, American Cyanamid Company 209

Problems With Pesticide Containers As Seen By Truckers (Highway)
Henry B. Lewis, Central Freight Lines, Inc.. 213

Problems With Pesticide Containers As Seen By Tank Truck Carriers
Clifford Harvison, National Tank Truck Carriers, Inc. 219

Problems With Pesticide Containers As Seen By Rail Transporters
A. F. Grassmuck, Association of American Railroads 221

Problems With Pesticide Containers As Seen By Pesticide Formulators and Distributors
Roland L. Rhodes, United Pesticide Formulators & Distributors Association 223

Problems With Pesticide Containers As Seen By Container Handlers
E. A. Cancienne, Louisiana Agricultural Aviation Society and Louisiana Cooperative Extension Service. 227

Pesticide Container Problems Encountered By the Home and Garden User
Harrison Dooley, Environmental Protection Agency. . 231

Problems With Pesticide Containers As Seen By Pest Control Operators
Roland L. Rhodes, United Pesticide Formulators & Distributors Association 243

Problems With Pesticide Containers As Seen By Farmers
Fernand Falgoust, Jr., Farmer 245

Problems With Pesticide Containers As Seen By Drum Reconditioners
Morris Hershson, National Barrel & Drum Association 247

Problems With Pesticide Containers As Seen By Landfill Operators
Dirk Brunner, Solid Waste Research Laboratory 251

Excerpts of Discussion Concerning Emergency Assistance Available Following Chemical Spills 255

Concluding Remarks of the Moderator
Emil Mrak, University of California 259

Section VII - Innovations and Practices to Make Containers Safer and Better

Plastic-Coated Glass Containers
H. F. Zink, Owens-Illinois 263

Plastic For Water-Soluble Containers
Kim Coppage, Mono-Sol 269

Water-Soluble Containers for Pesticide Use
Richard A. Broom, FMC Corporation 273

Collapsible Containers
Charles W. Kennedy and Daniel J. Gillett
Uniroyal Chemical Company 281

High Density Polyethylene Drums
Sid Levine, Advanced Chemical Technology 289

New Designs for Closures on Pesticide Containers
Haron Wise and Clarence Dearing, American
Flange & Manufacturing Co., Inc.. 293

Disposable Inner Liners - Tests for Permeation
R. F. Thomas, Environmental Protection Agency. . 297

Designs for Metal Pail Liners and Shields
Charles A. Speas, Hedwin Corporation 301

Critique and Assessment of Plastic Liners
H. Moss, Jr., Shell Chemical Company 305

Containerized Transport for Chemical Products
J. E. Zehner, Strachan Shipping Company 307

Rinse and Drain Procedure
Denis Hayley, National Agricultural Chemicals
Association 312

Pesticide Container Disposal and Reclamation System
James T. Conner, Chemagro. 325

A Case for Refillable Pesticide Containers
D. L. Worf and Tayler H. Bingham
Environmental Protection Agency and Research
Triangle Institute, respectively. 329

CONFERENCE PANEL DISCUSSIONS AND RECOMMENDATIONS 335

COMMENTS PROVIDED FOLLOWING THE CONFERENCE 367

ATTENDEES 401

AGENDA

NATIONAL CONFERENCE ON PESTICIDE CONTAINERS

Sponsored by
The Federal Working Group on Pest Management
and conducted by its Safety Panel

Time : November 28-30, 1972

Place: Hotel Sheraton-Charles
215 St. Charles Avenue
New Orleans, Louisiana

Purpose of Conference: To assess the current problems relating to pesticide containers, and determine trends in the development of new containers and new handling techniques to correct these problems.

Design of Conference: An industry-government-consumer (user) interface in a participatory forum involving the attendees as well as the speakers, utilizing the knowledge and experience of everyone present.

Conference Participants: Safety Panel of FWGPM, container and closure manufacturers, containers and product handlers and users, container disposers and reclaimers, regulatory officials, researchers, and educators.

Registration: Mezzanine lobby (no registration fee)
Sunday, Nov. 26 : 6-9 p.m.
Monday, Nov. 27 : 7:30-8:30 a.m., 6-9 p.m.
Tuesday, Nov. 28 : 7:30 a.m. - 2 p.m., 4:30 - 5:30 p.m.
Wednesday, Nov. 29: 7:30 a.m. - 1 p.m.
Thursday, Nov. 30 : 8-10 a.m.

Banquet tickets costing $10 and tour tickets costing $3.50 will be available at registration desk on mezzanine lobby. Selection of Panel Workshop subject should be given to registration desk at time of registration.

November 27, 1972: Pre-Conference Tour

Instructions: Meet in main lobby; buses leave hotel at 8:30 a.m.

Agenda (Continued)

Stops:

1. Aerial application site - V. Ray Thornton
   Cane-Air Aerial Applicators
   Belle Rose, Louisiana

2. Pesticide formulating plant - Sellers Chemical Corp.
   1320 Sams Avenue
   Elmwood Industrial Park
   New Orleans, Louisiana

3. EPA pesticide product testing and monitoring laboratories - Mississippi Test Facility
   Mississippi

CONFERENCE

November 28, 1972: Grand Ballroom

I. Introductions and Background

Welcome to New Orleans and Louisiana Thomas W. Purdy Director, Economic Development Council New Orleans Chamber of Commerce	9:00 a.m.
Greetings from the Sheraton-Charles Hotel Robert Hardwick, General Manager	9:05 a.m.
Role of the Federal Working Group on Pest Management and the Safety Panel Fred H. Tschirley, Chairman Federal Working Group on Pest Management Washington, D. C.	9:10 a.m.
Introduction and Charge to the Conference William H. Preston, Jr., Chairman Safety Panel, FWGPM Washington, D. C.	9:15 a.m.

Agenda (Continued)

II. Requirements and Standards for Pesticide Containers

Considerations by the Safety Panel of the FWGPM
Leonard C. Gibbs, Vice Chairman 9:30 a.m.
Safety Panel, FWGPM
Washington, D. C.

(Presented by Calvin M. Menzie)

Standards for Containers of Class B Poisons
William J. Burns, Director 10:00 a.m.
Office of Hazardous Materials
Department of Transportation
Washington, D. C.

(break) 10:30 a.m.

Container Standards - U. S. and International
Vincent Grey, Chief 10:45 a.m.
Intermodal Equipment, Maritime Administration
Department of Commerce
Washington, D. C.

III. Kinds and Numbers of Pesticide Containers

A Survey of Containers Presently in Use
Herman Delvo 11:15 a.m.
Economic Research Service
Department of Agriculture
Washington, D. C.

(lunch) 12:00 n

IV. Characteristics of Pesticide Containers - Designs, Components, and Manufacturing Considerations

Closures for Pesticide Containers
Haron Wise and Clarence Dearing 1:00 p.m.
American Flange & Manufacturing Co.
New York, New York

Raymond F. Ouer
Rieke Corporation
Auburn, Indiana

Agenda (Continued)

Tank Trucks
Vincent Grey, Chief 1:40 p.m.
Intermodal Equipment, Maritime
Administration
Department of Commerce
Washington, D. C.

Steel Drums
Arthur W. Nides, President 2:00 p.m.
Steel Shipping Container Institute
Union, New Jersey

Fibre Drums 2:30 p.m.
W. H. Gushard, Manager
National Sales & Technical Services
Greif Brothers Corporation
Union, New Jersey

Robert E. Byrne, Vice President
Plyfiber Container Corporation
Raritan, New Jersey

Louis L. Mrkvicka
Fibre Drum Division
Continental Can Company
New York, New York

Paul Dry
National Industrial Containers, Inc.
Pennsauken, New Jersey

(break) 3:00 p.m.

Paper Containers
C. G. Peterman, 3:20 p.m.
Executive Vice President
Paper Shipping Sack Manufacturers
Association
Scarsdale, New York

Glass Containers
Leonard Steiner, Manager 3:50 p.m.
Testing Services for Child-Resistant
Packaging
Kerr Glass Manufacturing Corporation
Lancaster, Pennsylvania

Agenda (Continued)

Plastic Containers
John Boyle, consultant to the 4:10 p.m.
chemical, petroleum, and plastic
container industry, and
government liaison representative
Oxon Hill, Maryland

High Density Polyethylene Drums
Sid Levine
Advanced Chemical Technology
Beverly Hills, California

November 29, 1972: Grand Ballroom

V. Regulations and Legislation Encompassing Pesticide Containers

Regulations of the U. S. Department of Transportation
William J. Burns, Director 8:00 a.m.
Office of Hazardous Materials
Department of Transportation
Washington, D. C.

The Poison Prevention Packaging Act
Henry L. Verhulst, Director 8:45 a.m.
Division of Chemical Hazards
Bureau of Product Safety, FDA
Department of Health, Education & Welfare
Washington, D. C.

(break) 9:15 a.m.

The Environmental Protection Agency Looks at Pesticide Containers

Registration and Regulation of Pesticides with Reference to Containers
Harold G. Alford, Special Assistant 9:30 a.m.
to Deputy Assistant Administrator for
Categorical Programs, Environmental
Protection Agency
Washington, D. C.

Pesticide Containers as Solid Waste for Disposal Systems
William Roper 9:50 a.m.
Systems Implementation Branch
Solid Waste Management Programs
Environmental Protection Agency
Washington, D. C.

Agenda (Continued)

Accidents and Incidents Related to Containers and Handling
Charles T. Mitchell, Head 10:05 a.m.
Accident Investigations
Office of Pesticide Programs
Environmental Protection Agency
Washington, D. C.

State Regulations Regarding Pesticide Containers

New York
Charles H. Frommer 10:15 a.m.
New York State Department of Environmental Conservation
Albany, New York

Minnesota
Rollin M. Dennistoun 10:30 a.m.
Minnesota Department of Agriculture
St. Paul, Minnesota

California
John Hillis 10:45 a.m.
California State Department of Agriculture
Sacramento, California

Military Requirements on Packaging for Transportation of Hazardous Materials
William Jones 11:00 a.m.
Joint Military Packaging Training Center
Department of Defense
Aberdeen Proving Grounds
Aberdeen, Maryland

(lunch) 11:30 a.m.

VI. Some General and Specific Problems with Pesticide Containers (Round table discussion, where container handlers, users, and disposers explain their problems to container manufacturers and regulatory officials.)

Agenda (Continued)

Introductory Remarks by Moderator
    Emil Mrak
    Chancellor Emeritus 12:30 p.m.
    University of California at Davis
    Davis, California

Problems as Seen by Container Handlers and Users
    Chemical Companies 12:40 p.m.
        R. F. Uncles, Manager
        Packaging and Labeling Department
        American Cyanamid Company
        Wayne, New Jersey

    Truckers (Highway)
        Henry B. Lewis
        Safety Director
        Central Freight Lines, Inc.
        Waco, Texas

    Tank Trucks
        Clifford Harvison, Manager-Director
        National Tank Truck Carriers, Inc.
        Washington, D. C.

    Rail Transport
        A. F. Grassmuck
        Association of American Railroads
        Chicago, Illinois

    Handler and User
        Roland Rhodes, President
        United Pesticide Formulators and Distributors
        Association
        Kansas City, Kansas

    Container Handler
        E. A. Cancienne, Executive Secretary
        Louisiana Agricultural Aviation Society and
        Louisiana Cooperative Extension Service
        Baton Rouge, Louisiana

Agenda (Continued)

Container Problems as Seen by Product Users 1:30 p.m.

Specialized Containers for Home and Garden
Harrison Dooley, Supervisor
Plant Biology Laboratory
Environmental Protection Agency
Corvallis, Oregon

Pest Control Operators
Roland Rhodes, Representative of
National Pest Control Association
Elizabeth, New Jersey

Farmers
Fernand Falgoust, Jr.
Farmer
St. James, Louisiana

Aerial Applicators
Ray Thornton, Representative of
National Agricultural Aviation Association
Belle Rose, Louisiana

(break) 2:10 p.m.

Problems as Seen by Disposal and Reuse Officials
2:25 p.m.

Drum Reconditioners
Morris Hershson, President
National Barrel & Drum Association
Washington, D. C.

Frank Langella, President
Bayonne Barrel & Drum Company
Newark, New Jersey

Landfill Operators
Dirk Brunner
Solid Waste Research Laboratory
Cincinnati, Ohio

Agenda (Continued)

The Case for Refillable Containers
Douglas Worf
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park
North Carolina

Taylor H. Bingham
Research Triangle Institute
Research Triangle Park
North Carolina

Moderator's Remarks on Problem Session, and Preparation for Panel Workshops 3:00 p.m.

VII. Panel Workshop, Session #1 3:15 p.m.

(Assessment of needs and the formulation of recommendations for research, regulations, improved information dispersal, and alternative approaches.)

Panel No. 1: Metal Drums
" " 2: Glass Containers
" " 3: Fiber Containers
" " 4: Plastic Containers
" " 5: Paper and Cardboard Containers
" " 6: Pressurized Cans and Specialized Devices
" " 7: Tank Cars and Tank Trucks
" " 8: Small Metal Containers

VIII. Food and Entertainment, Beauregard Room

Mixer 6:30 p.m.

Buffet Banquet 7:30 p.m.

After-dinner Entertainment 8:15 p.m.
Bud Fletcher, Cajun Comedian
New Orleans

November 30, 1972:

IX. Innovations and Practices to make Pesticide Containers Safer, More Useful, and Easier for Handling, Use and Disposal

Agenda (Continued)

Plastic-coated Glass Containers 8:30 a.m.
H. F. Zink, Manager
Product Development and Engineering
Toledo, Ohio

Plastic for Water-soluble Containers 8:45 a.m.
Kim Coppage
Mono-Sol, Division of Chris Craft
Gary, Indiana

Water-soluble Containers for Pesticide Use 9:00 a.m.
Richard A. Broom
Niagara Chemical, FMC Corporation
Middleport, New York

Disposable Inner Liners

Tests for Permeation 9:15 a.m.
Ronald F. Thomas
Supervisory Chemist
Residue & Special Projects Lab.
Environmental Protection Agency
Beltsville, Maryland

Designs for Liners and Shields 9:30 a.m.
Charles Speas, Vice President (Technical)
Hedwin Corporation
Baltimore, Maryland

Critique and Assessment of Plastic Liners
Herman Moss, Manager, Distribution 9:45 a.m.
Agricultural Division
Shell Chemical Company
San Ramon, California

(break) 10:00 a.m.

Collapsible Containers
Charles Kennedy and 10:45 a.m.
Daniel J. Gillett
Uniroyal Chemical Company
Mishawaka, Indiana

Rinse and Drain Procedure
Denis Hayley 11:15 a.m.
Secretary & Treasurer
National Agricultural Chemicals
Association
Washington, D. C.

Agenda (Continued)

Portable Drum Disposal System
James Conner 11:30 a.m.
Washington, D. C. Representative
Chemagro
Kansas City, Missouri

(lunch) 12:00 n

Containerized Transport for Chemical Products
Joseph E. Zehner, Jr. 1:00 p.m.
Strachan Shipping Company
New Orleans, Louisiana

New Designs for Closures on Pesticide Containers
Haron Wise and Clarence Dearing 1:30 p.m.
American Flange and Manufacturing Company
New York, New York

X. Panel Workshop, Session #2 2:00 p.m.

XI. Presentation of Panel Workshop discussion summaries and conclusions 4:00 p.m.

XII. Conference Evaluations 4:30 p.m.

December 1, 1972: Post-Conference Tour

Instructions: Meet in main lobby; buses leave hotel at 8:30 a.m.

Stops:
1. Pesticide formulating plant - Sellers Chemical Corp.
1320 Sams Avenue
New Orleans
Louisiana

2. Metal container manufacturing plant
- Rheem Company
4901 Jefferson Highway
New Orleans
Louisiana

Agenda (Continued)

3. EPA pesticide product testing and monitoring laboratories - Mississippi Test Facility, Mississippi

4. Drum reconditioning plant - Evans Cooperage Company, Inc.
Harvey, Louisiana

(Note: In case of high demand for tour, stops may vary in sequence. Details will be provided at registration desk on November 28, 29, and 30.)

* * * * * * * * * * * *

The Federal Working Group on Pest Management wishes to thank you for attending and participating in this Conference. Attendees are invited to provide appropriate additional papers or comments relating to this Conference for publication in the proceedings. These papers should be forwarded to the Executive Secretary of the FWGPM by December 21, 1972.

SAFETY PANEL
# of the
FEDERAL WORKING GROUP ON PEST MANAGEMENT

Department of Defense

Mr. Charles M. Buxton, Defense Supply Agency
LTC Marshall Steinberg, U. S. Army Environmental Hygiene Agency
Dr. P. G. Waldrep, Defense Supply Agency

Department of the Interior

Mr. Calvin M. Menzie, Bureau of Sport Fisheries and Wildlife

Department of Agriculture

Mr. John R. George, U. S. Forest Service
Dr. Leonard C. Gibbs, Extension Service (Vice Chairman, Safety Panel)
Mr. Charles L. Mangum, Animal and Plant Health Inspection Service
Dr. J. R. Plimmer, Agricultural Research Service
Dr. Warren C. Shaw, Agricultural Research Service

Department of Health, Education, and Welfare

Mr. William F. Barthel, Center for Disease Control

Department of Transportation

Mr. Willis F. Mitchell, Office of Hazardous Materials

Environmental Protection Agency

Mr. Donald A. Marlow, Office of Solid Waste Management Programs
Dr. William H. Preston, Jr., Office of Pesticide Programs (Chairman, Safety Panel)
Mr. Charles D. Reese, Office of Water Programs

Department of Labor (Liaison)

Mr. Charles Wilson, Occupational Safety and Health Administration

Federal Trade Commission (Liaison)

Mr. Stanley J. Gilmore
Mr. Tenny P. Neprud

National Agricultural Chemicals Association (Industry Liaison)

Mr. Denis Hayley
Mr. John M. Stackhouse

SAFETY PANEL
# of the
FEDERAL WORKING GROUP ON PEST MANAGEMENT

Recommendation No. 1

Regulate transportation of and containers for pesticides less toxic than Class B poisons.

Background

Pesticides which are less toxic than Class B poisons are not regulated in interstate commerce by the Department of Transportation or other federal agencies at present. Nevertheless, it is known that leakage of such pesticides due to a variety of causes may generate serious safety, health and environmental problems. Causes of such leakage are due to such factors as manufacturing or design defects, improper container specifications and inspection, mishandling in loading and unloading, improper palletization or other hazards in stacking, accidents in transportation, storage and handling.

These pesticide spills are common to all types and sizes of containers. While the hazard with Class B poison pesticides is of major concern, leakage of less toxic pesticides also may cause definite and significant safety and environmental problems.

It is recognized that advances have been made by the industry in design and manufacture of containers, yet failures still occur.

Regulation should also be developed to provide carriers and handlers with adequate information concerning the pesticide product on the bill of lading to enable proper emergency action in case of accident.

Implementation

DOT should establish regulations for transportation of and containers for pesticides less toxic than Class B poisons.

Recommendation No. 2

Develop a system or standards to preclude the use of ordinary glass containers for packaging pesticides of relatively high toxicity.

Background

It is common knowledge that one-gallon containers made of ordinary glass are subject to easy breakage once they are no longer held in protective cartons. Some transport of unprotected glass jugs of pesticides is almost inevitable, and usually takes place beginning either at the point of purchase in individual units or in preparation for mixing and spray operations on farms.

The Safety Panel has been informed at this Conference that special glass containers of much greater strength and impact resistance can be manufactured. The Panel is also aware that such containers would also cost more if used. It would appear that regulation may be the only means of preventing the packaging of pesticides in containers as easily broken as ordinary glass, and that specifications will be needed to augment any such regulations.

Implementation

EPA should ask industry to develop an effective voluntary program designed to preclude the use of ordinary, unprotected glass containers for packaging the more toxic pesticides. If this is not done, EPA and DOT should cooperate in the development of suitable standards and regulations that would prevent the packaging of pesticides of EPA toxic categories 1 and 2 in unsafe glass containers.

Recommendation No. 3

Develop standards for plastic containers and their closures so that they are mechanically and chemically compatible. These standards should relate primarily to containers for the pesticide industry.

Background

Plastic pesticide containers frequently leak because closure components are not compatible. It is not uncommon for various parts of a closure to be made by different manufacturers. Since firm standards are not used, the component parts do not always fit together well enough to prevent leakage.

Implementation

EPA should request that the Plastic Bottle Committee of the Society of Plastic Industries develop the necessary standards for plastic containers used to hold pesticides.

Recommendation No. 4

Develop acceptable standards of mechanical strength and durability applicable to paper containers for pesticides.

Background

Bursting and failure of paper bags of pesticides during loading, transportation, and other handling have caused poisoning accidents, potentially hazardous situations, and needless environmental contamination. These problems are, of course, additional to the obvious economic losses sustained in such circumstances. Development of adequate standards for paper containers that will be used for pesticides should result in a marked reduction in breakage problems, and such standards can be applied to paper container uses for other commodities.

Implementation

EPA should cooperate with the Paper Shipping Sack Manufacturers Association in the development of standards for paper bags for holding pesticides. In view of hazards that may arise in transportation, storage, home and farm use, DOT, USDA and DHEW cooperation and input should also be sought. Standardization may be accomplished through the action of a standards-setting organization such as ANSI or ASTM.

Recommendation No. 5

Establish guidelines for transportation of less than palletable quantities of large-bagged pesticides, such as 5, 10 or 50 bags per vehicle.

Background

For less than palletable quantities of large-bagged pesticides, hazards and contamination may result if the package is broken during transportation through careless handling, faulty packing of loads, or accidents. Practical guidelines should be available for safe carriage of bags to minimize the risk of contaminating other goods transported or causing harm to humans or livestock.

25<

Implementation

DOT should develop guidelines for transport of less than palletable quantities of pesticides in paper bags; DOL, USDA and the National Safety Council should be involved in development of these guidelines.

Recommendation No. 6

Encourage improvement of telescope-style fibre containers to prevent exhausting of pesticides when closing the containers.

Background

Pesticides formulated as powders, dusts, and granules are frequently packaged in telescope-style fibre containers. Usually the pesticides are held in plastic bags (though not always) within the fibre containers. When the entire quantity of pesticide is not used, the lids are routinely put back on the containers. Putting the lid on frequently compresses the air in the container, which then exhausts around the edge of the lid rim. The exhausted air is frequently mixed with dust and vapors of the pesticide product. At times a considerable quantity of pesticide is released which can easily contact unprotected body areas of the person closing the container, and be in the air he breathes. The faster he closes the container, the greater the potential for contaminating the exhausted air. Pesticides enclosed in plastic bags often provide the same potential for hazard as those not enclosed, since removal of bag contents often results in spillage inside the fibre container on the outside of the bag.

Implementation

EPA should contact the fibre drum industry and the agricultural chemical industry to explore redesign or new internal packaging of telescope-style drums, or consider alternative containers for pesticide packaging.

Recommendation No. 7

Develop a procedure to prevent fibre drums that contained pesticides from being reused for other purposes.

Background

So-called "empty" containers which once held pesticides are widely considered to be still contaminated. Because of the special ease of handling and removal, as well as the attractiveness of empty fibre drums, the likelihood of reuse of those which once contained pesticides can be great. Most such drums would originally have contained pesticide dusts, powders, and granules, and the drain and rinse procedure developed for liquids would not be appropriate.

The higher the quality of drum, the greater the likelihood of reuse, because of the attractiveness of the container to the potential reuser. Since Class B poisons are carried in very high quality drums, these drums could be very attractive and could pose especially dangerous reuse situations.

No confirmed reports of injury due to reuse of pesticide fibre drums have been brought to the attention of the Safety Panel, but there is no reasonable inexpensive system by which extent of reuse of pesticide drums can be measured. Steps to reduce or prevent such possible reuse would probably be much cheaper than developing a surveillance system to see how big the problem of reuse is.

Implementation

EPA should, in coordination with DOT, request the fibre drum container industry and the pesticide chemical industry to develop a warning system to protect the purchaser and user and to insure proper disposal of fibre drums which contained pesticides.

Recommendation No. 8

Develop standards and regulations which will result in better safety features for aerosol containers containing pesticides.

Background

a. Explosion hazard

From evidence presented at this Conference, from discussions held during workshop sessions and from recent charges by public interest groups, it is clear that violent and hazardous explosions can result from excessive internal pressures created by overheating pressurized containers. Although experience indicates explosions have been related principally to disposal of "used" pressurized cans, the nature of the articles presents problems in transporting and handling pressurized pesticide containers in trade channels.

Information was presented to this Conference that modification in the construction of the dome of pressurized cans has been achieved. At least one can manufacturer now offers these articles in all sizes to its customers and the technology to its licensed competitors. There has been a general reluctance on the part of product manufacturers to adopt a modified container and there is need to encourage acceptance of those types which would not present explosion hazards. It is recognized that pressurized containers designed to vent contents should not contain chemicals or concentrations posing hazards as serious as the explosions to be prevented.

b. Contamination to users

Certain pressurized spray products are offered with nozzle construction that requires operation with the forefinger next to the spray orifice. During spray operations the forefinger often gets contaminated with the spray material. Persons sensitive to the chemical contents of the pesticide product may be adversely affected as a result of this contamination. Common usage of aerosols and other pressurized products in and around the home would tend to negate label precautions concerning use of protective gloves, etc., on products that pose a contamination problem. A simple container modification such as an overcap spray nozzle that keeps the finger an adequately safe distance from the spray orifice would provide such protection. This overcap could at the same time provide an unmistakable indication of the direction of spray release, which would add additional safety for the user.

Implementation

DHEW and EPA should require, under their respective statutes dealing with hazardous materials, safer pressurized pesticide containers.

Recommendation No. 9

Develop and implement plans for collection and disposal of used pesticide containers from rural locations where hazardous pesticides are used.

Background

a. Containers at farms and other remote sites

At farms and many other rural locations, pesticide containers are generally stacked and stored at use sites until some convenient time for disposal or burial. Residues of pesticides in the containers continue to make them hazardous to handle or for a possible uncontrolled second use. Locations that are more remote from proper collection or disposal sites increase the hazard and possibility of misuse because of the time and effort involved in proper disposal. No directions on the packaging are given for disposal on many of the products the farmers use. In most states, no collection systems are available to make disposal convenient or safe. Often when containers are disposed of, the disposal is less than satisfactory, and the expense and trouble of proper disposal is not considered worth the time and effort. One solution offered at the Conference was development of an incentive system to encourage collection of used containers.

b. Containers at aerial application stations

The heavy usage of pesticide products, many of which are moderately to highly toxic, where aerial pesticide applicators begin their daily operations, has resulted in major accumulation and disposal problems of empty drums and other pesticide containers. Improper storage of these drums can at times result in hazardous situations. Transport and disposal of these empty containers is often costly, inconvenient, hazardous to handlers, and generally unsatisfactory to all concerned.

Implementation

EPA and USDA should cooperate with NAAA, NACA, and the drum reconditioning industry in the development of several alternative procedures to eliminate or markedly reduce the empty container problems at these sites.

Recommendation No. 10

Strengthen and broaden educational programs that emphasize safe usage and proper disposal of pesticides and their containers.

Background

Some of the present over-reaction as well as the gross lack of concern by the public to hazards associated with pesticides and their containers indicates that there is a critical need for educating the public on all aspects of the safe, proper and judicious use, storage, handling, transportation and disposal of surplus or waste pesticides and empty containers. Since almost all adults in the U.S. use pesticides several times a year, instruction beyond the label directions seems appropriate. If pesticides are to continue to be useful tools, some responsible elements in our society must shoulder the task of disseminating the correct information about pesticides to the grass-roots level of the general public.

Implementation

Appropriate segments of the USDA, EPA, and the pesticide chemicals industry should meet with the National Education Association or similar organizations to develop reasonable and appropriate instruction systems on pesticides, their proper handling, use, storage and disposal. Such instructions should be designed for specific levels from elementary school through adulthood.

Recommendation No. 11

Reassemble representatives of industry, government, and the pesticide users within two years to reassess problems relating to pesticide containers.

Background

Emil Mrak, Chancellor Emeritus, University of California at Davis and Moderator of the problem session at this Conference, stated that there is a need for continuing communication between government and industry, government and government, and industry and industry, relative to the whole subject of pesticide containers. He felt that there is need for education among government workers, industry workers and the public.

This Conference brought to light problems in transportation and storage unrecognized by container manufacturers, manufacturing considerations not appreciated by handlers and users, and roadblocks to recycling/disposal ideas unanticipated by the government and the public. Novel innovations and practices capable of making pesticide containers safer, more useful and easier for handling, use and disposal were described but it is the view of the Safety Panel that without the sponsorship of a neutral coordinating body the acceptance success or failure of any modifications might remain unknown due in large part to absence of communication.

Implementation

The Federal Working Group on Pest Management should sponsor a second National Conference on Pesticide Containers in 1974.

PRESENTATIONS

SECTION I

INTRODUCTION AND BACKGROUND

The Federal Working Group on Pest Management and its Safety Panel, and the reasons for and design of this Conference.

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The Federal Working Group on Pest Management and its Safety Panel, and the reasons for and design of this Conference.

THE FEDERAL WORKING GROUP ON PEST MANAGEMENT AND THE ROLE OF ITS SAFETY PANEL

by

Dr. Fred H. Tschirley
Chairman, FWGPM

Welcome to this National Conference on Pesticide Containers. As Chairman of the Federal Working Group on Pest Management - the organization which is sponsoring this meeting - I thought it would be helpful to briefly outline the organization and functions of the Federal Working Group.

The Federal Working Group on Pest Management is unique on the Washington scene in that its genesis is based on a voluntary agreement by Department Secretaries, and not on legislation or Executive Order. This is significant since collaboration forced by outside authority sometimes produces standoffs or outright confrontations with resulting interference in the very purposes requiring collaboration. In 1961, as a response to Presidential concern for interagency coordination in the use of pesticides, a voluntary agreement by the Secretaries of Agriculture; Defense; Health, Education and Welfare; and Interior; created the Federal Pest Control Review Board. This was purely an advisory board, composed of two members from each of the participating Departments, charged to provide joint review and coordination of all major federal pesticide use programs.

In 1964, in response to the President's Science Advisory Committee on Use of Pesticides, a charter was signed by the Secretaries of the four Departments formally creating the Federal Committee on Pest Control which superseded the Pest Control Review Board. Subcommittees on Program Review, Monitoring, Safety, Research and Information were subsequently added to assist the parent FCPC in its broadened scope and responsibilities. The replacement of the FCPC by the Working Group on the Subcommittee on Pesticides, President's Cabinet Committee on the Environment was announced by the White House in November 1969. The charter of the Working Group was published in the Federal Register on March 26, 1970. When Executive Plan III became effective in July 1970, the Cabinet Committee on the Environment was dissolved, although the Working Group continued to perform its functions. In October, by White House memo to the Chairman of the Council on Environmental Quality, the Working Group on Pesticides was made responsible to CEQ and its membership was expanded to include the Departments of Transportation, Commerce and State as well as the Environmental Protection Agency. CEQ, the Office of Science and Technology, Office of Management and Budget, and the Office of Intergovernmental Relations were also invited to participate as observers in deliberations of the Federal Working Group. In late 1971 along with publication of an updated charter, the name was officially changed to its present form - The Federal Working Group on Pest Management.

The Working Group is the primary coordinating mechanism for all federal activities in the general field of pesticides and pest management. It develops program and policy proposals and provides day-to-day coordination of Federal Pest Management programs for user agencies, regulatory agencies, health agencies, and conservation agencies. This coordination is provided through the input of over 100 scientist-administrators of diverse disciplines from member and observer agencies as well as some segments of industry, state and international agencies, and academic institutions.

Some specific activities of the Working Group include:

a. Review of all federally sponsored pest control programs for compliance with label requirements and for the purpose of preventing unnecessary environmental contamination; where an alternate non-chemical method is available, such method is recommended as a substitute;

b. Identification and coordination of research needs on pests and pest management systems;

c. Monitoring for pesticide residues in the environment;

d. Dissemination of information on pests and pest management systems;

e. Development of training programs that will result in an adequate level of competence by federal employees responsible for prescribing and utilizing various pest control techniques; and

f. Identification, development and coordination of safety measures in the use and disposal of pesticides.

It is in direct response to this last-named activity that you ladies and gentlemen were invited to this National Conference on Pesticide Containers. Members of the Safety Panel of the Working Group have identified, as one of the most critical current issues, the problem of pesticide containers. Examination of current literature, standards, criteria and other available information indicates a considerable diversity and in many instances a paucity of such information. The Panel has therefore addressed itself to the need to assess the current problems relating to pesticide containers and to determine trends in the development of new containers to correct these problems.

The largely unpublished activities and accomplishments of the Working Group are numerous and significant. For example, the Safety Panel has previously held a conference on the disposal of surplus pesticides. Out of this conference came four publications - A Summary of Interim Guidelines for the Disposal of Surplus or Waste Pesticides and Pesticide Containers; Ground Disposal of Pesticides; Disposal of Surplus Pesticides; and Disposal of Surplus Pesticides, Empty Containers and Emergency Situations. Detailed information on these safety-related publications is outlined in a flier which is available at the registration desk. Last May, we held a conference on protective clothing and safety equipment for pesticide workers which was unusually productive. Today's conference is the latest example of the type of effort related to safe use of pesticides to be undertaken by the Working Group.

Let me now turn the program over to the Chairman of our Safety Panel, Dr. William H. Preston.

Fred H. Tschirley is Coordinator of Pesticide Activities for the Science and Education Staff of the U. S. Department of Agriculture. He graduated from the University of Colorado and received his Ph.D. from the University of Arizona. He has had a long experience in research on woody plant control in USDA, and has been assigned to make special assessment of the effects of defoliants in Vietnam and herbicide damage in Cambodia.

36<

INTRODUCTION AND CHARGE TO THE CONFERENCE

by

Dr. W. H. Preston, Jr.
Chairman, Safety Panel

The topic of pesticide containers is one that has created discussion for years by many people. Lots of talk - lots of concern - lots of accusations - lots of passed bucks - lots of quick solutions that are impractical and would cause unnecessary complications and hardships. All of us here know that pesticides are useful tools when handled properly, a means of saving work, insuring crops and livelihoods, and making a better quality of life. But if a pesticide container poses any problem from the time it is filled until it is emptied - and I mean 100% emptied, - a path of anguish and tragedy for humans and the environment may be set.

How widespread and important is this so-called path of tragedy? What more can a container manufacturer do to prevent problems? Have we told him what really is needed? Are we willing to pay the price of improvement by utilizing safer containers? Are regulations on containers as good as they should be? Are we expecting too much of the user? Will the label directions suffice if the container is prone to be faulty in some way? What is to be done with the so-called empty container? Is it too attractive for reuse, yet deadly if it were to be reused? The Safety Panel has asked and been asked these and many related questions; we did not have the answers, and turned to all of you for your assistance. We've invited participants to this meeting from many walks of life - container and closure manufacturers, container and pesticide product handlers and users, container disposers and reclaimers, Federal and state regulatory officials, researchers, and educators - all of whom have a special interest in seeing that containers for pesticides serve usefully and safely the purposes for which they are intended.

The Conference is designed not just as a training class to sit and learn things, but to sharpen and broaden your perspectives for later input on the Panels. It is not a reunion of old friends and acquaintances, but a group of divergent people and ideas to be brought together for a common worthwhile cause. It is not a meeting of scientists gathered to discuss a specific phenomenon, but an assembly

37<

of people from many walks of life to view the pesticide container in relation to human safety and protection of our environment, to get some feel for the relative importance, diversity and complexity of the container issue, and to direct your thoughts toward innovative ways to reduce and eliminate container problems.

Thus, the Conference is designed to get your input, your ideas, your observations and your experience. The speakers have been selected to reveal to you the standards and limitations we can expect from containers, some of the regulatory aspects that involve pesticide containers, and some of the problems that various users of containers have encountered. Your job will be to put together your own knowledge and experience along with that of others to come up hopefully with a more accurate set of needs and improvements that would increase the safety and usefulness of pesticide containers. The series of two panel sessions will be interrupted by topics demonstrating innovations that may be relevant to your ideas and suggestions.

The Safety Panel of the Federal Working Group on Pest Management is charged with the responsibility of identifying problem areas related to aspects of safety in marketing, packaging, storing, transporting, distributing, applying and using, and disposing of pesticides. They must survey current research programs, and review pertinent policies and regulations. They must then recommend appropriate action to bring about solution or alleviation of the problems selected for study.

The Safety Panel members will work with you and your information during the Conference, and participate with you in the definition of needs and development of suggestions.

The speeches scheduled at this Conference will be published as part of the proceedings of the Conference. Each speaker is reminded that his spoken speech may deviate considerably from the written one due to use of slides, additional explanations, and time allowances. I do suggest, however, that each speaker provide as rapid delivery as possible to make certain there will be some time for discussion before the next scheduled speaker.

Any speaker or participant is welcomed to contribute remarks on special subjects that will add information and scope to the Conference. We invite many such remarks to be supplied later, if possible, in writing so that they may be entered as written remarks and published as part of the Proceedings. Such remarks may be written as briefly or lengthy as deemed necessary to be appropriate. In designing the Conference, we realize that many who were invited but could not be scheduled to speak in the formal program might have worthwhile contributions which would make the proceedings more valuable to everyone. Written remarks should be supplied during or as soon after the Conference as possible - preferably within about 3 weeks following the Conference - by December 21, 1972.

A record of your discussions, as prepared by each panel secretary you select, will be the 3rd part of the published Proceedings of the Conference. Every participant has an opportunity to have a hand in this. These will be developed from the 8 panels set up during tomorrow's program. We recommend that you take notes as you feel necessary to help you come up with the suggestions for research, better information dispersal, regulations, or other proposals that may be developed.

The Safety Panel, after having reviewed all speeches and discussion notes, and all comments supplied during or shortly after the Conference, will prepare a set of recommendations based upon the information received. These recommendations will be forwarded to the Federal Working Group on Pest Management, and efforts to implement as many as are approved by this body will be made.

We want as free and open discussion as possible throughout the Conference, but we must have an accurate and approved record of the speeches and scheduled remarks of this Conference. Because of past difficulties in preparing written proceedings of meetings such as this, the Safety Panel has found it necessary to tape-record speeches and some of the scheduled remarks at this meeting. You should be aware that this will not be done during the panel discussion sessions, as you will select your own recording secretaries. None of the recorded speeches will be used in any way if the speakers submit copies of their talks by December 21. None of the speeches, taped or typed, will be included in the Proceedings without the speakers' permission. You are also requested to announce ahead of time that no taping be made of statements if you do not wish them to be recorded.

39<

This kind of conference - designed as a participatory forum where industry, government, and the consumers and users interface - is somewhat experimental, and we are all here to see if and how well it will work. Your remarks about this kind of conference, during or after the meeting are welcomed so that we may determine the importance and usefulness of the means employed to get an across-the-board assessment of a diverse, many-faceted subject.

I wish to draw your attention now to the latter part of the Conference that is concerned with innovations. It is my personal belief that many problems can be solved by using innovative approaches to them. I consider that many problems with containers are especially appropriate for solving by new technological advances. The latter part of this Conference is to lead you to some new thinking and new approaches, and remind you of some innovative ideas already successfully put into practice. The rapid development of successful ideas can often obviate the need for more restrictive regulations. Hopefully, the greatest benefit coming from this Conference should be the establishment of a communication point for stimulating innovative approaches to solve container problems, and although such stimulation will not likely be recorded in the Proceedings of this meeting, the ultimate value of this Conference can be as far-reaching as you dare to imagine, plan, experiment, and put ideas into reality.

We appreciate your help, interest, and participation, and look forward to the contributions and progress that will come from your efforts.

William H. Preston, Jr. is Acting Assistant Director of the recently formed Criteria and Evaluation Division in the Office of Pesticide Programs of the U. S. Environmental Protection Agency. His academic training is in horticulture and he did undergraduate and graduate work at the University of Maryland. His experience in USDA and the Department of the Army was in plant introduction, research and testing of pesticides, and laboratory management.

SECTION II

REQUIREMENTS AND STANDARDS FOR PESTICIDE CONTAINERS

Considerations by the Safety Panel, standards for Class B Poison containers, and U.S. and international container standards

CONSIDERATIONS BY THE SAFETY PANEL OF THE FEDERAL WORKING GROUP ON PEST MANAGEMENT

by

L. C. Gibbs
Vice Chairman
Safety Panel. FWGPM
Washington, D. C.

Ladies, Gentlemen, and Co-Workers :

The Safety Panel of the Federal Working Group on Pest Management as it is known today, has been operative under other names for about eight years. During this period it has pointed up and acted on numerous items, many of which were problems related to pesticide containers.

The Safety Panel of the FWGPM is composed of eighteen members. Currently this comprises representation from six Departments and two separate Agencies, and the National Agricultural Chemicals Association with a liaison membership.

Any remarks I make are not intended to impress you but rather to give you an idea of some of the Safety Panel's past activities and to help set the stage for later presentations and deliberations in the working sessions. Perhaps this can best be done by briefly reviewing some of the problems the panel has considered and acted on during the course of the last several years.

Some of the more significant areas or problems related to containers on which the Safety Panel has worked follow.

1. Initiation, conduct and dissemination of the results of a survey of the number, size, kind and location of empty pesticide containers throughout the U. S.
2. A suggestion was submitted to the Safety Panel that drums intended for pesticide use be embossed with the words "Pesticide - Do not reuse for feed or food purposes." Discussion regarding the suggestion included (a) how the steel container industry could

predict specific pesticide usage of the drum, (b) the value of the statement since some pesticide labeling already carries similar statements, (c) the structural safety and practicality of such embossing on tops, sides, or bottoms of drums, and (d) whether drums so designated might not be accepted for reconditioning, thereby creating greater potential hazard through accumulation and improper disposal of so-called empty containers in the environment. The suggestion was tabled until there could be extensive communication with several groups in the container industry, such as we are having at this conference.

3. Results of a preliminary residue study relative to decontamination of 55-gallon steel drums by an incineration technique were provided to the Safety Panel. The study, involving only a parathion formulation, revealed that essentially none of the parathion remained. A number of chemical analysis questions pointed to the need for more definitive data, but none has since been submitted to the Safety Panel. Therefore, at this time, there is insufficient information to conclude that reconditioning does or does not render drums completely free of pesticides.

4. Initiated and forwarded a recommendation to our parent group pointing up the need for research work on disposal of surplus pesticides and empty containers. A later recommendation encouraged expansion and coordination of effort on this problem.

5. Initiated action and prepared an information publication on the state-of-the-art of pesticide waste and empty container disposal. This document included a series of recommendations or disposal guides endorsed by the parent group.

6. Reviewed developments related to use of rubberized tank type containers where feasible in lieu of conventional drums, pails, etc.

7. Reviewed status of research work underway on incorporating pesticides in polymer slow release form.

8. Reviewed developments in connection with packaging pesticides in water soluble packages.

9. Researched data on possibilities on disposal of pesticide wastes and containers in salt mines.

10. Researched possibilities of deep-well disposal of waste pesticides.

11. Cooperated with NACA in the development of Rinse and Drain Procedure.

12. Assisted the Working Group in its sponsorship of a National Working Conference on Pesticide Disposal.

13. Reviewed the status and possibilities of using symbols and color coding for pesticide containers.

14. Studied DOT and DOD requirements for pesticide packaging standards as they related to transportation and labeling from both the national and international viewpoint. Problem referred back to two departments concerned.

15. Studied problems of pesticide labeling and disposal of pesticides in GSA supply channels and transmitted several recommendations in reference to handling, sale, etc.

16. Studied commercial disposal methods and visited industry disposal and incineration sites.

17. Have looked into some of the possibilities of using liners for containers, closures, spouts, etc. designed to help minimize residual pesticides left in containers.

18. Cooperated with industry in dissemination of information on handling emergency problems resulting from spills, fires, flood, etc.

19. Have endorsed and promulgated guides for storage, handling and warehousing pesticides.

44<

The items mentioned are not all-inclusive by any means. I have, however, attempted to cite areas related to containers which I felt would be of interest in connection with the work sessions.

Now, I would like to conclude my remarks by calling your attention to a series of five recommendations for consideration for containers for liquid pesticides. These were developed as the result of a joint meeting of the three pesticide container work groups. Their recommendations follow:

1. Design that would provide for essentially 100 percent emptying of contents. Factors for consideration would be shape, location and design of pouring spout, construction material, linings, etc.
2. Construction that would withstand the conditions encountered in transportation and handling. For example, provide for palletizing and nesting conditions. road shocks, rolling, etc.
3. Container design and construction that would prevent leakage during transportation, handling, and storage such as the location and design of the closures, pouring spouts, carrying handles, seams and chimes, construction material, etc.
4. Construction or design that would afford easy identification of the product and protection to the label.
5. The container be of such quality and design that it can be reused or recycled without hazard to reuser or be disposed of safely.

In addition, research was recommended in all of the areas above.

Thank you for your attention. I hope my comments will be helpful in your work session deliberations.

My apologies for not being able to be with you and participate in what I feel can be a very useful and informative conference.

Leonard C. Gibbs is Project Leader for Pesticide Chemicals in the Extension Service of the USDA. He did undergraduate work at New Mexico State University and graduate work at Ohio State University and at Washington State University, where he was awarded the Ph.D. He has agricultural extension experience in New Mexico, California and in USDA, Washington, D. C.

REQUIREMENTS AND STANDARDS FOR PESTICIDE CONTAINERS OF CLASS B POISONS FOR TRANSPORTATION

by

W. J. Burns
Director, Office of Hazardous Materials
Department of Transportation

Good morning, ladies and gentlemen. I am very pleased to have this opportunity to address the National Conference on Pesticide Containers.

As you will note from the Program Agenda, I have two presentations to make during the Conference. Tomorrow I plan to discuss the DOT's Hazardous Materials Regulations generally. My subject today, however, will be a discussion on the requirements and standards for packaging of Class B poisons for transportation. Why talk about "Class B Poisons?" Well, simply stated, many pesticides are poisonous to humans and more specifically are "Class B Poisons" within the framework of the regulations.

In general the Department's Hazardous Materials Regulations apply to those pesticides which meet either the definition of a "Class A Poison" or a "Class B Poison." With very few exceptions, almost all of the pesticides which are regulated will fall within the category of a "Class B Poison." In all cases, the "Class A Poisons" are listed specifically by name in the commodity list of the regulations. These materials are extremely toxic in nature. The prescribed packaging requirements, therefore, are much more restrictive, and we allow no exemptions.

Let me expand somewhat on "Class B Poisons." What do we mean by a Class B Poison? As stated in the DOT regulations (49 CFR) "Class B Poisons" are those substances, liquid or solid (including pastes or semisolids), other than Class A or Class C poisons, which are known to be so toxic to man as to afford a hazard to health during transportation or which in the absence of adequate data on human toxicity are presumed to be toxic to man because they fall within any one of the following testing categories when tested on laboratory animals." The categories for toxicity include:

1. Oral toxicity

46<

2. Toxicity by inhalation

3. Toxicity by skin absorption

Several Class B Poison pesticides, such as methyl parathion, parathion and parathion mixtures, are classified and specifically provided for by name in the DOT regulations. As such, the specific packaging requirements and any exemptions are specifically listed. The more general scheme of things as it applies to most of the regulated Class B Poison pesticides, however, is to list generic "asterisk" items in the commodity list, such as "insecticides, dry," "insecticides, liquid," "organic phosphate compound, liquid, n.o.s.," "organic phosphate compound mixtures, liquid, n.o.s.," or "organic phosphate compound mixtures, dry, n.o.s." The "asterisk," therefore, means essentially that the material in question may or may not be classified and regulated as a Class B Poison, depending upon its toxicity when rated against the three aforementioned test criteria. Such testing and classification of material is the responsibility of the shipper of the material. It should be noted that many pesticides are not regulated by the Department since they do not meet the toxicity test criteria. The packaging requirements for the regulated "asterisk" items will usually fall within either of the following general areas:

1. As exempt liquids - Unless the regulations state "no exemption," these materials must be packaged in tightly closed inside containers which are cushioned to prevent breakage. The maximum quantities are limited to one quart if a glass container is used or one gallon if metal or polyethylene is used, provided a strong outside wooden barrel or box is used. If the outer container is of fiberboard, the inner package may not contain more than one pint if it is of glass or one quart in the case of metal or polyethylene. Such packages are exempt from specification packaging, marking and labeling requirements.

2. As exempt solids - Unless it is a specifically named material, e.g., "parathion mixtures," "organic phosphate compounds, n.o.s.," and several others, for which specification packaging is prescribed, all solid Class B Poison materials must be packaged in tightly closed inside containers which are cushioned to prevent breakage.

The maximum quantities as limited by weight, depending upon the type of material used for the inner and outer container, will vary from 30 to 100 pounds per outside container. Such packages are exempt from specification packaging, marking and labeling requirements.

3. Within specification containers for liquids - The regulations allow the shipper to select certain "specification" DOT packagings from a broad range of container types and sizes, including metal drums, wooden barrels or kegs, fiberboard outer boxes with certain types of inner containers, railway tank cards, compressed gas cylinders, tank motor vehicles, fiber drums, etc. In each case the volume or weight limitation of material is stated, or otherwise limited by the specification itself. Several very commonly used DOT specification steel drums used for pesticides include the DOT Spec. 5B, 17C, and 17E in the closed head configurations. In addition to any specific packaging requirement which may be prescribed, liquid Class B Poison packages must also be provided with sufficient outage of the interior so as to prevent leakage or distortion of the container due to expansion of the contents from increase of temperature during transit. Such outage must not be less than one percent in the case of railway tank cars, and additionally liquid contents must not be loaded into the domes of tank cars.

4. Within specification containers for solids - In a similar fashion as for Class B Poison liquids, the regulations allow the shipper to select from a broad range of "specification " DOT packagings. Again, the DOT Spec. 5 and 6 series, 17B, 17H, 37A and 37B steel drums and pails are quite commonly used as pesticide shipping containers.

It is also important to recognize that there are some pesticides which are regulated as some other classification, such as either flammable liquids or flammable solids, rather than as Class B poisons. In those cases the material may be listed specifically by name or generically.

With regard to shipment requirements for Class A and B poisons, the carrier "must not transport Class A or B poisons in the same vehicle with material which is marked or known to be foodstuffs, feeds, or any other edible material intended for consumption by humans or animals."

I next would like to discuss the transportation experience with Class B Poison shipping containers and specifically with pesticide containers. In terms of numbers, recent industry estimates indicate that in 1970 over 41 million new drums or pails were used as containers for pesticides, out of a total of over 112 million used by all industry. Of these 41 million, 92,000 were of 30 gallon capacity, 144,000 of 50 gallon, over 15 million of 5 gallon, and over 25 million of one gallon capacity. These figures bring into perspective the tremendous problem of safe disposal or recycling of empty pesticide containers, which, of course, will be the subject of other papers during this Conference.

Since the vast majority of regulated pesticides are shipped in metal drum or pail-type shipping containers, it would be appropriate to discuss container failure experience for these types of containers. A review of the experience data gathered by the Office of Hazardous Materials during the first 20 months of its hazardous materials incident reporting system which has been imposed on carriers, indicates several major causes of container failures:

1. Side seam weld failures
2. External punctures
3. Defective closures
4. Chime failures
5. Bottom failures
6. Damage by other freight
7. Dropped in handling

Increased effort is being devoted by the Department to effect increased quality control and testing programs by the suppliers of specification containers. Concurrently with this program, research and development are being carried out to consolidate and upgrade the DOT specifications for shipping containers.

During the period January 1971 through August 1972, a total of 5020 hazardous materials incident reports were submitted by carriers to the Department. Of these 386 reports involved Class B poisons, and of these 195 were identifiable as involving pesticides. Of these about one third involved organic phosphate compounds. The single most common failure appears to be seam failure of DOT Spec. 17E closed head drums.

What does the future hold for regulation of pesticide transportation safety? In general, over the long range, upgrading of the safety requirements is quite probably in two general areas.

First, more pesticides may be "brought into the fold" as a result of new classifications which will be established for hazardous materials in the basis of their health hazards. Future proposed rule making is planned which will establish new classification and test criteria for "extremely toxic substances," "highly toxic materials," and "irritating substances." Such an improved system for establishment of hazard degrees is necessary in order to more appropriately establish packaging criteria reflecting the potential severity of the damage if a product should escape from its packaging during transportation.

Secondly, increased packaging requirements will be recommended that will be more closely related to the potential hazard in transportation. It is possible that modifications to the specification packaging requirements themselves will be made as a result of reevaluation of the adequacy of the specification criteria.

In summary, we have discussed briefly some aspects of Class B poison packaging, with specific comments directed to the packaging of those pesticides which are regulated for purposes of transportation. I hope that these remarks will help to bring into perspective and clarify the DOT requirements for pesticides, as contrasted to those pesticide regulatory requirements by other agencies.

William J. Burns, Director of the Office of Hazardous Materials, is also Chairman of the Hazardous Materials Regulations Board. He graduated from the University of Maryland and holds a Master of Business Administration from American University. During World War II, he was a Captain in the Army Transportation Corps, then later held important shipping and transportation posts in Germany for the military and the State Department, and in the U. S. as Advisor in the Office of the Secretary of Defense. Since then, he has served as Managing Director of the Munitions Carrier Conference of ATA, Inc. and Vice President of Tri-State Motor Transit Company.

50<

CONTAINER STANDARDS - U. S. AND INTERNATIONAL

by

Vincent Grey
Department of Commerce
Washington, D. C.

When we talk about standards, particularly voluntary standards applicable to the industrial community, we must talk about the American National Standards Institute. ANSI, as it is popularly referred to, has two principle objectives. One deals with domestic activities and the other international. In the U. S., ANSI serves as a clearing house for national standards which, when they are approved, are given the title "American National Standards." The name of the organization derives from this name of the standards rather than the reverse.

In order to be approved as an American National Standard, it is necessary to show evidence of support of a draft by a national consensus. The consensus is established by those who are interested and affected by the content of each standard. Proposed standards are frequently developed by an individual trade association or technical society, and then submitted to ANSI for approval as American National Standards. ANSI in turn checks to find out whether all those organizations that are concerned have indeed submitted some form or evidence of support. When the national consensus is determined, the standard is declared to be an American National Standard. Such groups as the American Society for Testing and Materials, National Fire Protection Association, and others, use this form of developing national standards.[1]

However, there's a second method also very commonly used, which is to form an American National Standards Committee under the procedures of ANSI. By this approach, each organization appoints a representative to serve as his spokesman in this committee. The combined voice of this total committee reflects a national consensus. There have been times when additional "outside-the-committee" viewpoints had to be solicited to establish a consensus on a specific standard.

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[1] Interested persons are referred to: Progress Report of the American National Standards Institute, ANSI, 1430 Broadway, New York, N. Y. 10018, December 1971.

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The ANSI K62 series of standards has used this latter technique. K62 is the project on common names for pest control chemicals. It was formed by ANSI back in 1954 at the request of the Department of Agriculture. When the proposed project was suggested, a committee was established with membership composed of such groups as the American Chemical Society, the Plant Physiologists, Entomology Division of the USDA, the Trademark Group, Weed Science Society, and more recently the Environmental Protection Agency. Each of these organizations appointed a representative to the committee. This committee continues to exist. It has already approved some 120 common names for pest control chemicals, and 10 additional are in process of being approved. What this project does is assign and register a formal specific name for a pesticide or herbicide or fungicide, thus placing it in the public domain.

Simultaneous with the approval of the national standards is the activity that goes on in the international sphere, so that the public exposure to this common name is achieved not only within the United States, but within the international sphere as well. The committees of the American National Standards Institute are open to all concerned. There are a number that I would like to cover in a little bit of detail this morning with you because they touch exactly on the topic for this conference.

MH5 on freight containers, I believe, is one freight container activity that this conference should look at, considering what Bill Preston said this morning: that one of the aims of this conference is to draw back the curtain and look at new areas for pesticide packaging. It may be years before you ever ship pesticides in 5000 gallon lots abroad, yet that is the potential of this type of standardization activity. And I have some slides that I would like to show in a moment that display the kind of potential that would be available to you.

I mentioned the international activity. The American National Standards Institute serves as the U. S. spokesman in an international arena for standardization. This international arena is the International Organization for Standardization, ISO. There are some 149 different committees established in ISO dealing with all manners of topics, subjects and types of equipment. They cover pallets, institutional clothing, screw threads, things that we need in today's society to exist in commerce between countries and within our own country. Because international standards are the common language by which trading nations understand each other technically, commercially, and legally, American interests must participate in writing the standards that have world-wide acceptance. This is accomplished within ISO through ANSI.

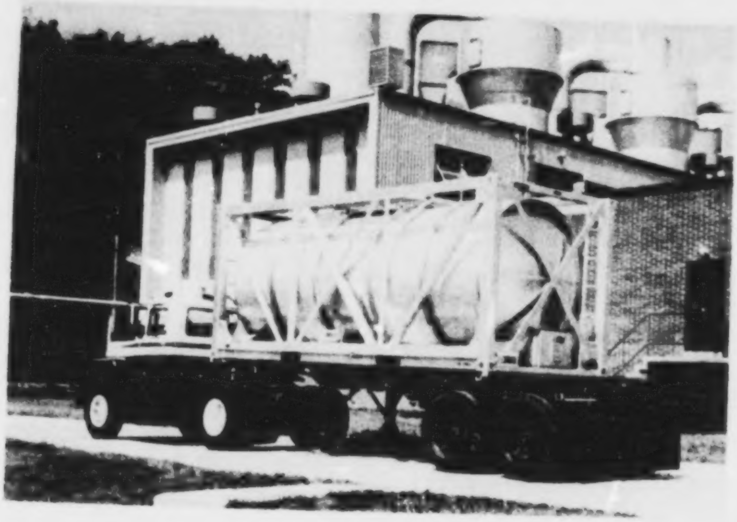
American National Standards Institute has developed some 5000 American national standards. They cover such topics as safety requirements for explosive-actuated fastening tools, national electrical codes, and pictorial marking for the handling of goods. Bill Burns was speaking of the labels that would appear on the packages that govern dangerous aspects. But there is a project which covers the handling instructions to the man that lifts the package. ANSI has standardized illustrations that are stenciled or labeled on a package to convey - without words - such messages as "sling here," "stow away from heat," "this end up," and other instructions of that type. ANSI covers such items as vocabulary for information processing, specifications for credit cards, the screw thread that is used on the base of an incandescent lamp that permits you to move from one part of the country to another part and yet have the lamp interchange in the socket. These are covered by the American National Standards and are but a few examples of the 5000 national standards.

With the advent of intermodal containers has come a multi-billion dollar rejuvenation of the world's transportation system. The freight shed on the dock is giving way to the container marshalling yard. Ship cranes are giving way to the monolithic structures, costing over 1 million dollars each, but capable of loading and unloading a 17 thousand ton container ship within 6 hours. (That is, 17 thousand tons taken off and 17 thousand tons put on.) The forklift truck, commonly found on the piers to move a pallet load of cargo goods, is now being used to stuff the containers. And monster lift trucks are now being employed to lift the entire container and move it into the crane area where it can then be put aboard the ship.

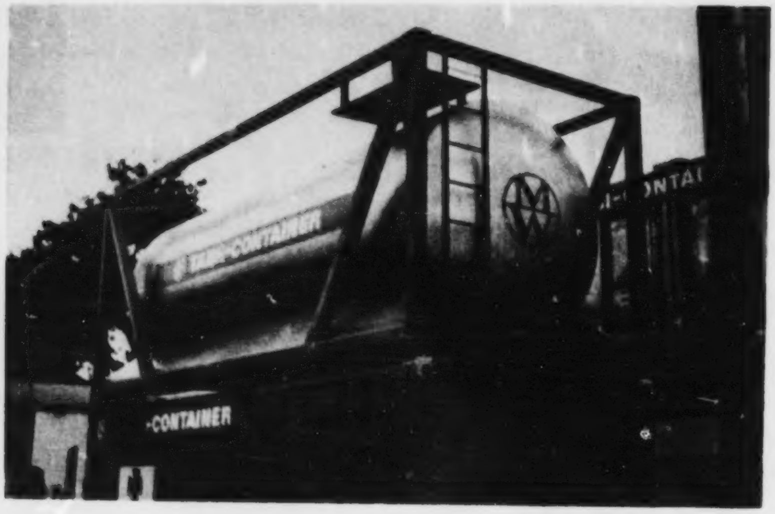
In and around the marshalling yard area, we're totally revising the materials handling concept: straddle carriers, overhead gantries, and yard jockies. All are now being used to move these large containers from one place to another.

And now I'd like to show you some of the slides, not only what is being used for bulk liquid container movement but also some of the dry van containers and other types of containers which will be used for the transport of pesticides and insecticides and the like. It will be either in bulk, dry bulk, in pelletized form, it could be granulated, in paper sacks, in cloth sacks, drums, pails and the like.

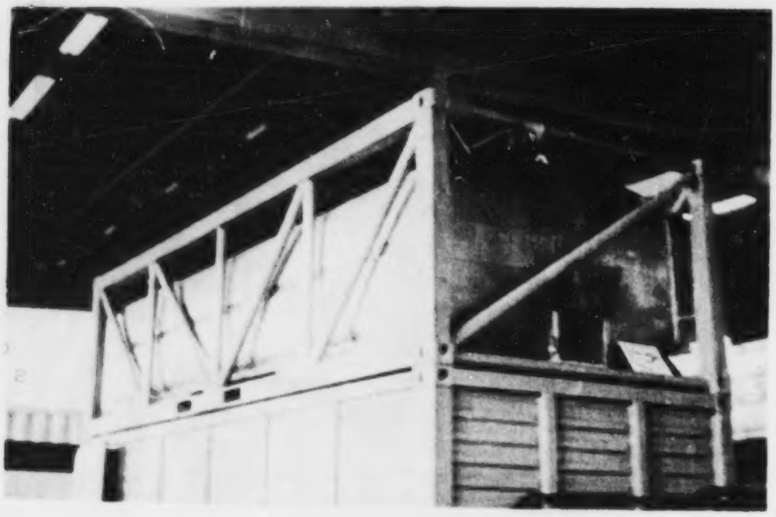
Note: Mr. Grey showed numerous slides of different types of freight containers. The following were chosen for reproduction because of their special interest.



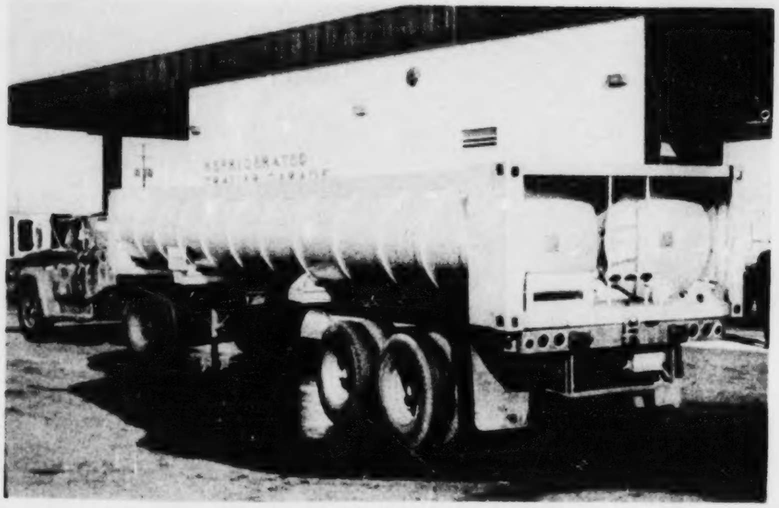
Slide 1 - American made (Fruehauf Corp., Detroit) ISO standard dimensioned tank container (8 ft. x 8 ft. in cross-section and 20 ft. in length) having a 5000 gallon capacity. Shell is manufactured to DOT 51 tank specifications and can be pressurized to 100 psi.


TANK-CONTAINER
-CONTAINER
-CONTA

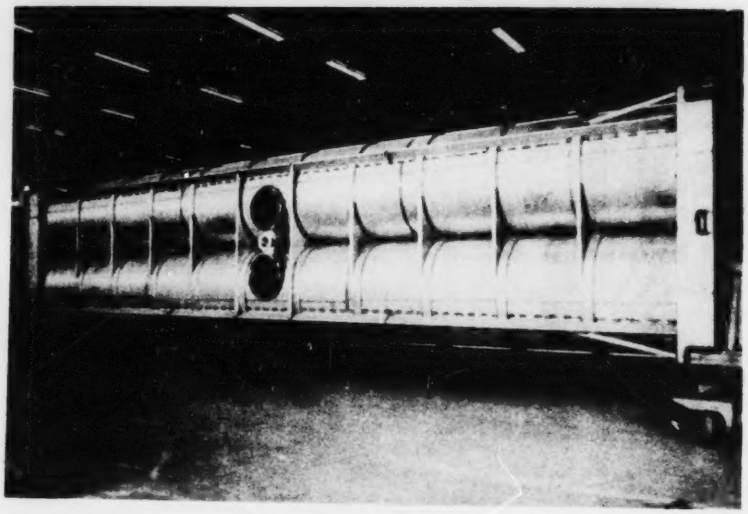
Slide 2 - German-made tank container of same type as above, shown in stacked position above a dry van container.



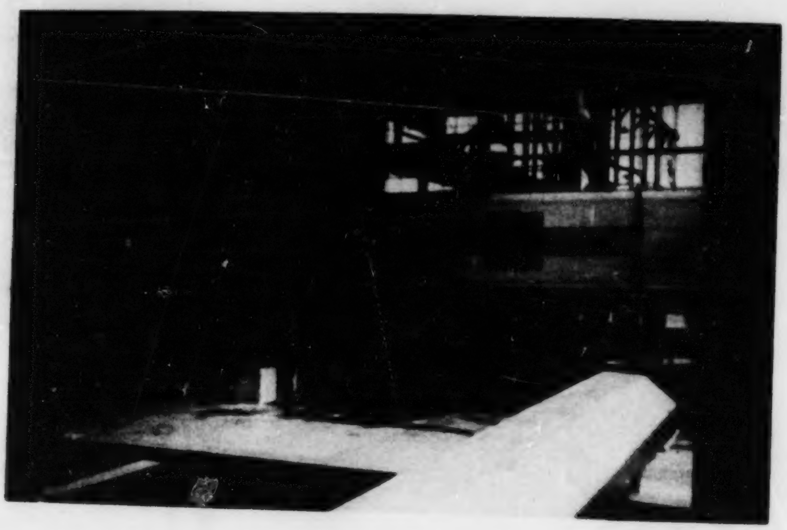
Slide 3 - British insulated semi-oval tank container, non-pressurizable. Capacity approximately 4000 gallons. Valve box door is shown open.



Slide 4 - The largest carrier of tank containers in the world is Sea-Land Service Inc. of Port Elizabeth, New Jersey. The overall dimensions are 8 ft. wide, 4 ft. 3 in. high and 35 ft. in length. A twin-barrel construction is used giving a total capacity of 4300 gallons. This is one of the early designs before corrugated sheet jackets were installed around tanks.



Slide 5 - When the Sea-Land tank containers are being manufactured they are turned on the side to facilitate entry of workers through the manholes. Metal skirting is added at final stage and decals affixed.



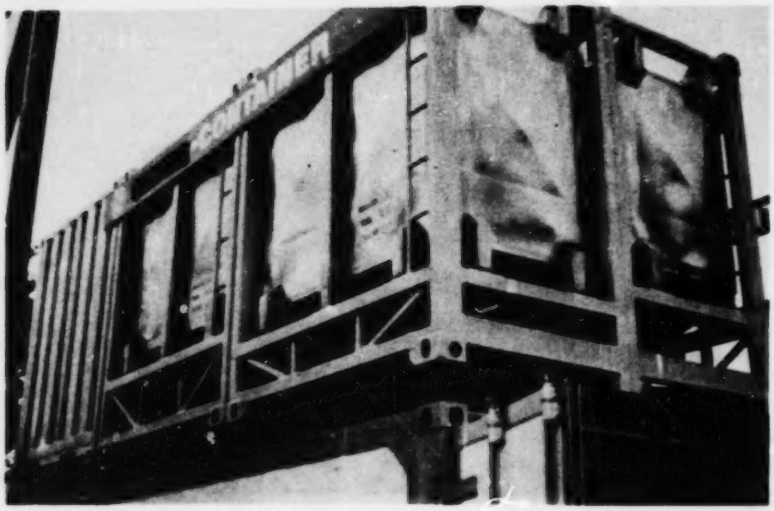
Slide 6 - Overseas tank container in a cleaning rack to be flushed or steam cleaned prior to being dispatched to pick up next load. Two hundred and thirty commodities listed as hazardous by DOT have been approved for transport in these containers, some of which are insecticides.

CAUTION
OPEN DOME COVER
PRIOR TO UNLOADING
4

Slide 7 - Tank container valve box opened showing discharge valve and emergency valve tripping lever.

95 754
CLEAN
EMPTY

Slide 8 - Front end view of tank container on chassis. A manufacturer's DOT design plate, identification plate, serial numbers, customs TIR certificate and DOT placarding are discernable.



Slide 9 - Dry bulk containers 8 ft. wide, 8 ft. high and 6-2/3 ft. in length; three of which make up a standard 20 ft. container length. These German units are non-pressurized, gravity-unloaded using a hopper at the bottom.

Slide 10 - Lockheed C-5A cargo transport. Trailer loads of intermodal containers are being maneuvered for loading aboard aircraft. The Boeing 747 cargo version also has a capability of moving standard size freight containers.

The economic advantages are yours that accrue from moving goods in large quantities. It doesn't mean that every item can be moved in the same quantity. There are limitations depending on the nature of the hazards involved in the commodity. But many hazardous commodities have already been approved for this kind of transport. The container further provides a ready means of storage and protection from the elements.

The harmonized efforts of our domestic and international standardization activities permit tank containers to move intermodally anywhere in the world. The elements of design necessary to bring about interchangability have been adopted in ANSI and ISO. The application of tank containers to the transport of bulk pesticides is now up to the shipper, and we urge you to look at this new concept of moving your commodities.

Thank you.

SECTION III

KINDS AND NUMBERS OF PESTICIDE CONTAINERS

Results of a USDA survey on containers presently in use

PESTICIDE CONTAINERS ASSOCIATED WITH CROP PRODUCTION

by

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Washington, D. C.

Introduction

Pesticides are important in the production of food and fiber in the United States. Their use permits more intensive and specialized farming practices. However, increased use of pesticides has created public concern. Some pesticides are persistent and remain in soil, water, air, and food. Others are toxic to warmblooded animals and may be harmful to those who handle, apply, or come in contact with them after they are applied. The concern about increased pesticide use goes beyond the applications to crops and livestock. It also includes the disposition of unused pesticide materials and empty pesticide containers.

This paper deals with pesticide containers associated with crop production. It includes information on size of containers, materials from which containers are made, and methods of disposing of the containers. The data presented in this report are preliminary.

A recent nationwide enumerative survey of about 8,500 farmers obtained national and regional estimates of farm uses of pesticides and other farm production expenditures in 1971. The survey technique was a multiple frame probability sample which included an area frame sample and a list sample. This paper is based on pesticide container information collected from about 1,500 U.S. farmers in the area frame sample who bought and applied pesticides in 1971. No container information was obtained for pesticides applied by custom operators because these statistics were beyond the scope of the survey.

For the pesticide container questions, the information from each farmer was limited to the one crop that accounted for his largest pesticide expenditure in 1971. About 50 different crops were represented. Those for which pesticide container information was most frequently reported were corn, soybeans, small grains, tobacco, fruits, cotton, potatoes and other vegetables. Farmers were asked to report information on no more than three pesticide materials.

Where more than one type of pesticide was used, enumerators were instructed to collect information for up to three different types of pesticides.[1] But if only herbicides or insecticides were reported as being used on the crop, the enumerators were instructed to obtain information on as many as three materials for which expenditures were greatest. The farmer responses were tabulated by pesticide ingredients. Thus the number of responses exceeded the number of farmers reporting pesticide container information.

The information in the tables is based on about 2,400 responses to questions on pesticide containers from 1,500 farmers. The statistics are in terms of frequency distributions of responses to questions concerning container size, container materials, and disposal methods used by farmers in 1971. In this preliminary report no estimate was made of the number of pesticide containers or quantity of pesticide materials used on farms.

Containers for all Pesticides

For all pesticides, farmer responses were almost equally divided between liquid and dry containers. About 47 percent of the responses were for liquid material containers and 50 percent for dry material containers (table 1). The other 3 percent were not identified.

Responses for liquid and dry herbicide containers followed the same general distribution as for all pesticide containers. However, insecticides and fungicides were more frequently reported being bought in dry containers--63 percent of the responses for insecticides and 74 percent for fungicides. On the other hand, only liquid containers were reported for growth regulators.

The 1-gallon and 5-gallon containers were the most frequently reported sizes for liquid pesticides. These two sizes of containers, accounted for about 82 percent of the responses for all liquid pesticides. For both liquid and dry containers, the two sizes accounted for 38 percent of all responses.

Dry pesticides were most frequently purchased in 4 to 5 pound or 50 pound and over containers. For dry containers, about 85 percent of the responses for all pesticides were in these size categories. For both liquid and dry containers, these two size groups accounted for 42 percent of the responses for all pesticides. Insecticides were more often reported in 50 pound and over containers--28 percent of the responses for insecticides--while herbicides were more frequently reported in 4 to 5 pound containers--30 percent of the responses for herbicides.

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[1] Information on herbicides, insecticides, fungicides, growth regulators, and other pesticides are included in this report.

For all pesticides, paper and metal containers were the most frequently reported--46 percent of the responses were for paper and 35 percent were for metal. Paper containers were most important for packaging fungicides and insecticides--84 and 60 percent of the responses, respectively. Herbicides were bought in metal containers more often than in paper containers. Metal containers accounted for 44 percent of responses for herbicides while paper accounted for 42 percent. Plastic containers were more important in packaging growth regulators than for all other types of pesticides. But half of the responses concerning growth regulator containers indicated the use of metal containers.

Farmers indicated that most of the pesticide containers remained at or close to the farms--about 87 percent of the responses. The others were chiefly taken to commercial dumps or returned to the dealers.

The method of container disposal does not mean the final "resting place" in the environment of any pesticide material still in the container, but only what farmers did with the container. For example, burning does not always destroy the chemicals but may vaporize them so that they could move in the environment. The responses by the farmers indicate the initial disposition of the containers. Burned out metal containers or ashes from paper and plastic containers may later be taken to a dump or buried.

For all pesticides, container disposal on the farm was generally by burning--about a half of the responses. Paper and plastic containers were generally burned. Some farmers indicated that metal containers were also being burned out. Thus, the percentage burned is sometimes greater than the sum of paper and plastic containers.

Disposing of pesticide containers on private dumps or by burying was also important--almost 25 percent of the responses. Other containers were retained on the farm--about 11 percent of the responses. These generally contained unused pesticides. But, some farmers indicated that they retained empty pesticide containers for other uses. Only 2 percent of the responses showed pesticide containers were left in the field or at the location where the sprayer was filled.

Even though farmers indicated that in 1971 they made little use of commercial dumps and seldom returned containers to dealers, they indicated a willingness to deliver pesticide containers to a central collection point within the county if proper disposal facilities were available. Just over half, about 52 percent, of the responses supported this type of container disposal procedure.

Insecticide Containers

Insecticide packages varied by type of product. Carbamates and organochlorines were more often reported as being packaged in dry containers--80 percent and 70 percent of the responses, respectively (table 2).[2] For organophosphate insecticides, farmer responses indicated that both liquid and dry containers were about equally important.

The most frequently reported size of dry containers for the carbamates and organochlorines was 50 pounds and over. Next in importance was the 4 to 5 pound size. For liquid organophosphates, the 1- and 5-gallon containers were most frequently reported while for the dry organophosphates the 4 to 5 pound and 50 pound and over size were most important.

Paper and metal containers accounted for about three-fourths of the farmer responses for all insecticides. Farmers indicated that the carbamate insecticides were generally purchased in paper or plastic containers.

Farmers indicated that organochlorine and organophosphate insecticides also were generally bought in paper containers. However, glass and metal were also important

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[2] Over 90 percent of the responses regarding carbamate insecticides dealt with carbaryl, carbofuran, or Bux. Carbaryl accounted for over half of these responses. Nearly three-fourths of the farmer responses for the organochlorine insecticides were associated with either aldrin, heptachlor, chlordane, or toxaphene. Aldrin accounted for over half of the responses.

container materials for organophosphate insecticides--primarily methyl and ethyl parathion and malathion.

Most of the paper insecticide containers were burned on the farm. Many of the plastic containers and most of the glass and metal containers were taken to private or commercial dumps.

Containers for toxic organophosphates were disposed of at commercial dumps or returned to dealers more frequently than other pesticides. Nearly 15 percent of the farmers' responses indicated organophosphate containers were disposed of this way--11 percent to commercial dumps and 4 percent were returned to dealers. Farmers also indicated more of a willingness to return organophosphate containers to a central collection point than organochlorine or carbamate containers.

Herbicide Containers

The packaging of herbicides varied by type of product (table 3). Nearly all the responses for phenoxy herbicides, primarily 2,4-D, indicated packaging in liquid containers while nearly all of the triazines, mainly atrazine, were purchased in dry containers. [3] Amides, mainly propachlor and alachlor, were packaged in both liquid and dry containers. Liquid containers accounted for over one-third of the farmer responses and dry containers close to two-thirds for amides.

The phenoxy herbicides were most frequently reported packaged in 1-gallon or 5-gallon liquid container sizes--84 percent of the responses. Amides were generally reported in 5-gallon liquid containers--28 percent--or dry containers of 50 or more pounds--56 percent. Nearly 80 percent of the farmer responses concerning triazines indicated they were packaged in 4 to 5 pound dry containers.

Metal phenoxy herbicide containers were generally disposed of on private or commercial dumps, but more than a fourth of the responses indicated that these containers were retained on the farm. Paper and plastic amide containers

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[3] Of the responses concerning phenoxy herbicides, 2,4-D accounted for more than 90 percent. Nearly 95 percent of the responses in the triazine group were for atrazine.

were most frequently burned, and the metal amide herbicide containers were generally taken to private and commercial dumps. The triazine packages, predominantly paper, were most often burned.

Insecticide and Herbicide Containers for Selected Crops

The kinds of pesticide containers associated with crop production vary by crop and by the general type of pesticides such as insecticides or herbicides.

Most of the corn insecticides were reported bought in 50 pound and over dry containers (table 4). Cotton insecticides were more often reported to be purchased in 5-gallon liquid containers. Tobacco insecticides were most frequently reported in 1-gallon liquid containers or in 4 or 5 pound dry containers. Insecticides used in fruit production were most often reported purchased in 1-gallon and 5-gallon liquid containers, or in 4 or 5 pound dry containers. Vegetable insecticides were most frequently reported bought in 4 to 5 pound or 50 pounds and over dry containers.

Insecticides used in corn and vegetables production were most frequently packaged in paper containers. Paper and metal insecticide containers were most important for cotton and fruits--metal was more important for cotton and paper was more important for fruits. Tobacco insecticides were most often reported packaged in paper containers followed by glass and plastic. Glass insecticide containers were more important for tobacco than for the other crops. A fourth of the responses for tobacco insecticides indicated purchases in glass containers.

Most of the herbicides reported for corn were packaged in either 4 or 5 pound or 50 pound and over dry containers, and in 1-gallon or 5-gallon liquid containers (table 5). They were mainly paper or metal containers.

Herbicides for use on small grains were most often reported bought in 5-gallon containers. Farmers indicated that herbicides were also purchased frequently in 1-gallon and in 29-30 gallon containers. Most of these herbicides were in metal containers.

Cotton herbicides were most frequently purchased in 1-quart, 1-gallon, or 5-gallon liquid containers, and in 4 to 5 pound dry containers. About two-thirds of the responses indicated that metal containers were used for packaging cotton herbicides. Other materials reported being used were mostly paper and plastic.

Soybean herbicides were most frequently purchased in 5-gallon liquid containers or 4 to 5 pound or 50 pound and over dry containers. These containers were mostly metal or paper.

Most of the herbicides purchased for the use in fruit production were packaged in 4 to 5 pound dry containers or in 1-gallon or 5-gallon liquid containers. These containers were most frequently paper or plastic.

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Table 1.--Percentage distribution of farmer responses to pesticide container questions on container sizes, container materials, methods of container disposal, and collection preferences by pesticide groups, United States, 1971 1/

Item	Insecticides	Herbicides	Fungicides	Growth regulators	Other pesticides	All pesticides
	Percent					
Size of containers:						
Liquid containers						
1-pint or less	1.0	1.4	---	3.0	5.8	1.5
1-quart	3.9	2.6	1.0	9.7	1.2	3.3
1-gallon	14.0	18.5	5.1	74.6	14.0	19.7
5-gallons	10.1	24.5	2.0	12.7	12.8	18.4
29 to 30 gallons	0.7	3.6	2.0	---	11.6	2.8
50 to 55 gallons	1.6	.1	---	---	7.0	.8
Total liquid	31.3	50.7	10.1	100.0	52.4	46.5
Dry containers:						
3 or less pounds	7.2	.9	13.3	---	5.8	3.3
4 to 5 pounds	19.1	30.2	30.6	---	15.1	24.8
20 to 25 pounds	9.0	2.6	4.1	---	4.6	4.4
50 pounds and over	27.8	13.9	25.5	---	18.6	17.6
Total dry	63.1	47.6	73.5	---	44.1	50.1
Other containers	5.6	1.7	16.4	---	3.5	3.4
Total containers	100.0	100.0	100.0	100.0	100.0	100.0
Container material:						
Glass	10.2	2.5	1.0	6.7	7.0	5.0
Metal	16.2	44.0	8.2	50.0	39.5	34.8
Paper	59.8	42.5	83.7	---	38.4	46.5
Plastic	10.1	8.4	5.1	43.3	12.8	10.9
Other	3.7	2.6	2.0	---	2.3	2.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Method of disposal: 2/						
Returned to dealer	1.9	3.1	4.1	2.2	12.7	3.1
Burned	61.0	45.0	71.4	21.7	43.0	49.2
Buried	3.7	6.6	7.1	6.0	5.8	5.8
Private dump	16.7	18.4	2.0	51.5	14.0	18.9
Commercial dump	7.1	9.6	8.2	4.5	5.8	8.4
Left in field	1.3	.7	---	.7	1.2	.9
Left where sprayer filled	.6	1.5	---	.7	1.2	1.1
Retained	6.9	13.3	4.1	11.2	14.0	11.0
Other	.8	1.8	3.1	1.5	2.3	1.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Would use collection points- -						
Yes	52.3	51.3	46.9	43.0	53.5	51.6
No	47.7	48.7	53.1	47.0	46.5	48.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
	Number					
Number of responses	666	1,373	98	134	86	2,357

1/ Based on unpublished preliminary data from 1972 Farm Production Expenditure Survey, U.S. Dept. Agr., Statis. Rptg. Serv.

2/ Note that the method of container disposal does not mean the final "resting place" in the environment of any pesticide materials still in the container, but only what farmers did with the container. For example, burning does not always destroy the chemicals but may vaporize them so that they could move in the environment. Also, the responses by the farmers indicate the initial disposition of the containers. Burned out metal containers or ashes from paper and plastic containers may later be taken to a dump or buried.

Table 2.--Percentage distribution of farmer responses to insecticide container questions on container sizes, container materials, methods of container disposal, and collection preferences by insectide groups, United States, 1971 1/

Item	Organo-chlorines	Organo-phosphates	Car-bamates	Other insecti-cides	All insecti-cides
	Percent				
Size of containers:					
Liquid containers					
1-pint or less	1.5	1.9	---	---	1.0
1-quart	5.3	3.5	4.6	1.3	3.9
1-gallon	10.7	17.4	8.6	21.5	14.0
5-gallons	6.9	17.8	1.5	11.4	10.1
29 to 30 gallons	1.5	1.2	---	---	.7
50 to 55 gallons	---	1.6	---	8.9	1.6
Total liquid	25.9	43.4	14.7	43.1	31.3
Dry containers:					
3 or less pounds	2.3	6.6	13.1	2.5	7.2
4 to 5 pounds	13.0	15.5	23.2	30.4	19.1
20 to 25 pounds	6.1	8.5	12.6	6.3	9.0
50 pounds and over	48.9	18.2	31.3	15.2	27.8
Total dry	70.3	48.8	80.2	54.4	63.1
Other containers	3.8	7.8	5.1	2.5	5.6
Total containers	100.0	100.0	100.0	100.0	100.0
Container material:					
Glass	9.2	11.6	5.6	19.0	10.2
Metal	14.5	26.0	2.0	22.8	16.2
Paper	62.6	50.0	71.7	56.9	59.8
Plastic	5.3	8.9	18.2	1.3	10.1
Other	8.4	3.5	2.5	---	3.7
Total	100.0	100.0	100.0	100.0	100.0
Method of disposal: 2/					
Returned to dealer	1.5	3.9	---	1.3	1.9
Burned	61.8	53.1	74.8	50.6	61.0
Buried	6.1	3.9	2.5	2.5	3.7
Private dump	8.4	18.2	16.7	25.3	16.7
Commercial dump	8.4	11.2	1.0	6.3	7.1
Left in field	.8	.8	1.5	3.8	1.3
Left where sprayer filled	1.5	.4	---	1.3	.6
Retained	9.2	8.1	3.5	7.6	6.9
Other	2.3	.4	---	1.3	.8
Total	100.0	100.0	100.0	100.0	100.0
Would use collection point:					
Yes	50.4	57.4	47.5	50.6	52.3
No	49.6	42.6	52.5	49.4	47.7
Total	100.0	100.0	100.0	100.0	100.0
	Number				
Number of responses	131	258	198	79	666

1/ Based on unpublished preliminary data from 1972 Farm Production Expenditure Survey, U.S. Dept. Agr., Statis. Rptg. Serv.

2/ Note that the method of container disposal does not mean the final "resting place" in the environment of any pesticide materials still in the container, but only what farmers did with the container. For example, burning does not always destroy the chemicals but may vaporize them so that they could move in the environment. Also, the responses by the farmers indicate the initial disposition of the containers. Burned out metal containers or ashes from paper and plastic containers may later be taken to a dump or buried.

Table 3.--Percentage distributions of farmer responses to herbicide container questions on container sizes, container materials, methods of container disposal, and collection preferences, by herbicide groups, United States, 1971 1/

Item	Phenoxy	Amides	Triazines	Other	All herbicides
	Percent				
Size of containers:					
Liquid containers					
1-pint or less	2.8	---	---	2.2	1.4
1-quart	1.4	0.5	---	7.4	2.6
1-gallon	41.0	5.0	2.5	22.0	18.5
5-gallons	43.2	27.8	.7	32.1	24.5
29 to 30 gallons	9.0	2.2	.2	3.0	3.6
50 to 55 gallons	.3	---	---	.3	.1
Total liquid	97.7	35.5	3.4	67.0	50.7
Dry containers:					
3 or less pounds	---	---	2.1	.7	.9
4 to 5 pounds	---	2.8	78.4	17.0	30.2
20 to 25 pounds	.3	2.8	4.8	2.2	2.6
50 pounds and over	2.0	56.1	8.3	11.6	13.9
Total dry	2.3	61.7	93.6	31.5	47.6
Other containers	---	2.8	3.0	1.5	1.7
Total containers	100.0	100.0	100.0	100.0	100.0
Container material:					
Glass	5.1	---	---	4.0	2.5
Metal	89.8	35.0	2.3	52.6	44.0
Paper	2.3	50.0	85.3	28.6	42.5
Plastic	2.8	7.2	9.9	12.1	8.4
Other	---	7.8	2.5	2.7	2.6
Total	100.0	100.0	100.0	100.0	100.0
Method of disposal: 2/					
Returned to dealer	4.2	1.7	3.0	3.0	3.1
Burned 3/	7.1	61.7	77.0	36.5	45.0
Buried	6.5	5.5	5.8	8.1	6.6
Private dump	32.2	11.1	4.8	24.0	18.4
Commercial dump	16.4	7.2	6.0	8.4	9.6
Left in field	.8	---	.2	1.5	.7
Left where sprayer filled	2.3	2.2	.2	1.7	1.5
Retained	28.0	8.9	2.1	14.6	13.3
Other	2.5	1.7	.9	2.2	1.8
Total	100.0	100.0	100.0	100.0	100.0
Would use collection point:					
Yes	56.2	53.9	41.0	57.0	51.3
No	43.8	46.1	59.0	43.0	48.7
Total	100.0	100.0	100.0	100.0	100.0
	Number				
Number of responses	354	180	434	504	1,373

1/ Based on unpublished preliminary data from 1972 Farm Production Expenditure Survey, U.S. Dept. Agr., Statis. Rptg. Serv.

2/ Note that the method of container disposal does not mean the final "resting place" in the environment of any pesticide materials still in the container, but only what farmers did with the container. For example, burning does not always destroy the chemicals but may vaporize them so that they could move in the environment. Also, the responses by the farmers indicate the initial disposition of the containers. Burned out metal containers or ashes from paper and plastic containers may later be taken to a dump or buried.

3/ Percentage burned may be greater than the sum of the paper and plastic percentages because some farmers reported metal and glass containers were burned.

Table 4.--Percentage distribution of farmer responses to insecticide container questions on container sizes, container materials, methods of container disposal, and collection preferences, by selected crops, United States, 1971 1/

Item	Corn	Cotton	Tobacco	Fruits	Vegetables
	Percent				
Size of containers:					
Liquid containers					
1-pint or less	---	---	0.6	1.1	2.5
1-quart	0.4	8.8	9.9	1.1	2.5
1-gallon	.8	8.8	30.2	16.0	5.0
5-gallons	5.0	41.3	8.1	18.1	7.5
29 to 30 gallons	.4	---	---	3.2	---
50 to 55 gallons	---	14.7	1.2	2.1	---
Total liquid	6.6	73.6	50.0	41.6	17.5
Dry containers:					
3 or less pounds	2.9	---	10.5	14.9	12.5
4 to 5 pounds	10.8	8.8	22.7	27.6	32.5
20 to 25 pounds	14.2	---	8.7	---	12.5
50 pounds and over	56.7	14.7	6.4	7.4	22.5
Total dry	84.6	23.5	48.3	49.9	80.0
Other containers	8.8	2.9	1.7	8.5	2.5
Total containers	100.0	100.0	100.0	100.0	100.0
Container material:					
Glass	.4	5.9	25.0	7.4	7.5
Metal	5.8	58.8	12.2	30.9	7.5
Paper	80.5	20.6	41.9	54.3	75.0
Plastic	5.0	14.7	20.9	5.3	7.5
Other	8.3	---	---	2.1	2.5
Total	100.0	100.0	100.0	100.0	100.0
Method of disposal: 2/					
Returned to dealer	---	---	1.7	8.5	---
Burned 3/	85.5	47.0	42.4	46.9	72.5
Buried	2.5	---	4.1	7.4	2.5
Private dump	5.4	26.5	39.5	7.4	5.0
Commercial dump	3.3	11.8	4.1	17.0	2.5
Left in field	---	---	2.3	---	10.0
Left where sprayer filled	.4	2.9	---	1.1	---
Retained	2.5	11.8	4.7	10.6	7.5
Other	.4	---	1.2	1.1	---
Total	100.0	100.0	100.0	100.0	100.0
Would use collection point:					
Yes	43.8	79.4	57.6	44.7	40.0
No	56.2	20.6	42.4	55.3	60.0
Total	100.0	100.0	100.0	100.0	100.0
	Number				
Number of responses	240	34	172	94	40

1/ Based on unpublished preliminary data from 1972 Farm Production Expenditure Survey, U.S. Dept. Agr., Statis. Rptg. Serv.

2/ Note that the method of container disposal does not mean the final "resting place" in the environment of any pesticide materials still in the container, but only what farmers did with the container. For example, burning does not always destroy the chemicals but may vaporize them so that they could move in the environment. Also, the responses by the farmers indicate the initial disposition of the containers. Burned out metal containers or ashes from paper and plastic containers may later be taken to a dump or buried.

3/ Percentage burned may be greater than the sum of the paper and plastic percentages because some farmers reported metal and glass containers were burned.

Table 5.--Percentage distributions of farmer responses to herbicide container questions on container sizes, container materials, methods of container disposal, and collection preferences, by selected crops, United States, 1971 1/

Item	Corn	Small grains	Cotton	Soybeans	Fruit
	Percent				
Size of containers:					
Liquid containers					
1-pint or less	0.9	0.0	2.8	1.5	0.0
1-quart	0.5	0.8	21.1	2.3	0.0
1-gallon	15.3	17.4	22.5	3.8	26.7
5-gallons	16.9	57.9	29.7	37.1	10.0
20 to 30 gallons	0.6	21.5	1.4	6.8	3.3
50 to 55 gallons	0.0	0.0	1.4	0.0	0.0
Total liquid	34.2	97.6	78.9	51.5	40.0
Dry containers:					
3 or less pounds	1.2	0.0	0.0	0.8	0.0
4 to 5 pounds	41.9	0.8	15.5	15.9	40.0
20 to 25 pounds	3.5	0.8	1.4	1.5	0.0
50 pounds and over	17.5	0.0	0.0	29.5	6.7
Total dry	64.1	1.6	16.9	47.7	46.7
Other containers	1.7	0.8	4.2	0.8	13.3
Total containers	100.0	100.0	100.0	100.0	100.0
Container material:					
Glass	0.6	5.0	0.0	0.0	0.0
Metal	30.6	90.0	66.2	49.2	10.0
Paper	56.6	2.5	18.3	40.2	50.0
Plastic	9.1	2.5	14.1	4.5	33.3
Other	3.1	0.0	1.4	6.1	6.7
Total	100.0	100.0	100.0	100.0	100.0
Method of disposal: 2/					
Returned to dealer	2.0	12.4	2.8	2.3	6.7
Burned 3/	58.3	6.6	38.0	47.0	53.3
Buried	6.4	5.8	7.1	6.8	10.0
Private dump	15.3	18.2	36.6	8.3	3.3
Commercial dump	9.2	14.9	2.8	9.1	6.7
Left in field	0.4	2.5	2.8	0.0	0.0
Left where sprayer filled	0.6	0.8	2.8	7.6	0.0
Retained	6.8	34.7	5.7	15.9	16.7
Other	1.0	4.1	1.4	3.0	3.3
Total	100.0	100.0	100.0	100.0	100.0
Would use collection point:					
Yes	47.2	49.6	60.6	58.3	60.0
No	52.8	50.4	39.4	41.7	40.0
Total	100.0	100.0	100.0	100.0	100.0
	Number				
Number of responses	782	121	71	132	30

1/ Based on unpublished preliminary data from 1972 Farm Production Expenditure Survey, U.S. Dept. Agr., Statis. Rptg. Serv.

2/ Note that the method of container disposal does not mean the final "resting place" in the environment of any pesticide materials still in the container, but only what farmers did with the container. For example, burning does not always destroy the chemicals but may vaporize them so that they could move in the environment. Also, the responses by the farmers indicate the initial disposition of the containers. Burned out metal containers or ashes from paper and plastic containers may later be taken to a dump or buried.

3/ Percentage burned may be greater than the sum of the paper and plastic percentages because some farmers reported metal and glass containers were burned.

SECTION IV

CHARACTERISTICS OF PESTICIDE CONTAINERS

Designs, components, and manufacturing considerations for closures, tank trucks, steel and fibre drums, and containers made of paper, glass, and plastic

CLOSURES FOR PESTICIDE CONTAINERS - I

by

Haron Wise and Clarence Dearing
American Flange & Manufacturing Co., Inc.
New York, New York

Up to this point, we've had presentations mostly from government officials and governmental regulatory agencies that are involved in packaging specifications pertaining to pesticide management.

I'm sure you will agree that this meeting offers an excellent opportunity for exchange and interface with these various governmental agencies concerning the packaging of pesticide chemicals. I think we have all long awaited the opportunity for this type of exchange.

Today, as my first presentation in this meeting (I will be speaking to you again on Thursday), I will speak briefly about the closures presently in existence which are being used on a large number of pesticide containers at the present time.

First, it may appear there is not a great deal that can be said about a flange. However, (slide) as you can see, this is no ordinary flange. It is readily identifiable by its octagonal shape. The shape of the flange prevents the possibility of any rotation of the flange in the drum head stock and allows the flange to be inserted flush against the drum stock to allow for more complete drainage and ease in reconditioning.

The most common size flanges are 2" and 3/4"; however, a 1-1/2" size is also available. The flange material is of high quality steel and is also available in two grades of stainless steel. These flanges can be plated as required and come with a variety of lacquered coatings and finishes. A wide range of gasket material for the flanges is also available. These include the most commonly used buna rubber as well as hypalon, neoprene and even teflon if desired.

As you can see, the flange insertion process creates a seat for the plug gasket; and, when the plug is applied as shown, only nominal amounts of torque are required to properly seat the plug into the flange. In addition to the octagonal shape flange shown here, other type flanges available include the polygonal flange (slide) which is inserted essentially in the same manner and is used for more corrosive products where metal to metal contact is undesirable. There is one additional flange that is completely polyethylene clad. This flange is normally used in conjunction with a drum having a plastic inner liner or a plastic coating inside. This flange is designed for the highly corrosive products where there can be no metal contact with the product.

There are a wide variety of plugs available for use with the octagonal flange (slide). This particular plug shown here is a zinc die cast plug. Other plugs available include steel, polyethylene, polypropylene and nylon. The steel plug can be coated or plated as required and comes with a wide range of gasket materials. Most of these plugs are also available as vented plugs; others have faucet carrying attachments, 3/4" combination plugs, etc.

As for cap seals, there are essentially three types available (slide). The cap seal shown here is the steel type with the flowed-in gasket. As you can see, the gasket material seals on the flange curl at this point. There is also an aluminum cap seal available which offers the same leak-proof protection as the steel cap seals but has the added customer convenience of ease of removal. The plastic cap seal (slide) shown here also offers the same leak-proof protection and seals over the flange in this area. The proper tools required for application of these cap seals are available upon request. It is important to point out that the correct tool must be used with each different type cap seal to assure proper application.

(Slide) This slide shows a cut-away section of a 2" flange inserted into the drum stock with the plug in place and the cap seal applied. Again, I will just point out some of the inherent advantages of this particular closure. There is the flush feature of the flange insertion allowing more complete drainage and more thorough cleaning in the reconditioning process. The plug, shown in place, requires only nominal amounts of torque to be properly seated into the flange. The cap seal, properly applied, offers added protection against leakage, pilferage, dilution of product, and tampering. These three points, the flange gasket, the plug gasket, and the cap seal gasket area, represent the three characteristics of sealing found in this drum closure.

As for small container closures or light closures (as we refer to them), (slide) these represent the two most commonly used closures. First, this is the opening required to accept the 67 mm clinch-on nozzle which is available in various sizes from 1-3/4" up to 2-1/4" in diameter. The material here is tin plate. However, a polypropylene spout is also available if desired. The nozzles can be lacquered to meet the requirement of the particular material being packaged, and a wide range of liner material is available for the screw cap as shown applied here.

In addition to the clinch-on nozzle, a clinch-in nozzle is also available in various sizes from 1-3/4" up to 2-1/4" in diameter. This particular nozzle is obviously applied by the pail manufacturer whereas the clinch-on spout assembly can be applied either by the filler or the pail manufacturer. This nozzle is also available with various coatings applied as required. Spouts can be of either metal or plastic and can be of the vented or non-vented variety.

One additional item that may be used in conjunction with the clinch-on or clinch-in closure is the 3/8" polypropylene vent fitting shown here (slide). This fitting is widely used as a venting device on a number of small containers and is normally applied by the container manufacturer. It is available with or without diaphragm as shown at this point. As you can see, it has a captive cap and offers a simple reclosure feature.

Gentlemen, this concludes a brief summary of the drum closures and fittings manufactured by American Flange which are most commonly used in pesticide packaging today. If there are any questions at this time, I will be happy to answer them for you. I might add that assisting me in my presentation today is our plant manager of our Linden, New Jersey, plant, Mr. Clarence Dearing. Thank you.

(Slides and more information are available directly from Mr. Wise. Ed.)

Haron Wise, National Sales Manager for American Flange and Manufacturing Company, New York, graduated from Troy State University in Alabama with a major in marketing. He did graduate work at Washington University in St. Louis, Missouri. He has held positions in American Can Company, Shell Oil Company (purchasing), and has had experience in packaging for the last nine years.

Clarence Dearing is the Plant Manager for American Flange and Manufacturing Company in Linden, New Jersey. He graduated from the Illinois Institute of Technology, Chicago, Illinois, and has had 30 years experience in closures, steel drums, industrial containers, and plastics.

CLOSURES FOR PESTICIDE CONTAINERS - II

by

Raymond F. Ouer
Rieke Corporation
Auburn, Indiana

Mr. Chairman, Ladies, and Gentlemen, it is a pleasure for me to be here today and to be able to give you a brief review and history of our closures, particularly as related to the pesticide industry and for use with pesticide containers.

Several of our closures have been in use by the industry for many years and been used successfully but I do believe it appropriate at this time to give a short description with the aid of charts on the easel as to the construction of our closures.

First, I would like to discuss the steel closure and, particularly, how the flange is inserted into the drum stock. There are only two ways that a steel flange can be inserted into the drum stock. One method is to wrap the flange around the drum stock and the other method is to wrap the drum stock around the flange. The latter way is the method and the way Rieke originally developed this closure over 50 years ago. In the first operation we punch and draw the opening, thereby creating a pocket for the flange to be seated. The second operation flattens the flange embedding the serations into the drum stock and wrapping the drum stock around the flange itself. This creates the flat gasket area which I am pointing out here. You will note there is no internal gasket required on our flange; however, there is a caulking compound therein similar to that which is used in double seams on drums for the purpose of dispensing if required through pipe nipple or faucet or spigot. You will note by the construction of the flange and plug when inserted the one gasket required, that is the plug gasket, seals onto the drum stock thereby sealing the container in this manner. In this manner we seal the drum stock in a vise-like grip between the flange and the plug with, of course, the proper gasket necessary for compatibility with the product being packaged. We have a variety of gaskets available for this purpose.

Naturally, the question comes up as to how tight is tight when sealing the drum plug and gasket to the drum stock; therefore, historically, we have developed a pre-set torque wrench which I am holding in my hand. These are available in various settings such as 40-30 for the more hard gaskets such as asbestos or polyethylene. Also, it comes in 30-15 which is for your softer durometer gaskets. When the wrench is torquing in the plug at the proper torque setting that is being used with any particular wrench, the wrench handle breaks slightly and the operator from this feel will realize that the gasket is torqued into the proper required torque. By turning the wrench over the 3/4" side the proper torque is established for the 3/4" plug.

After the plug is torqued in properly, of course, we have available capseals in both metal and plastic which seal in this area as I'm pointing on the chart, onto the drum stock secured under the curl that has been created by the insertion of the flange. This offers a completely tamper proof seal for the filler.

I would like to spend a few moments on the description of our next closure, which is plastic. I might add that this is not used as widely in pesticide containers; however, I think it important to briefly describe this closure to you at this time. This closure can be used on both steel and fiber drums with metal heads; and as you can see by the drawing to which I am pointing, the operation in the container manufacturer's plant is to draw this reverse curl in two operations. After this has been performed it leaves a three inch diameter opening for ready fillability, and the closure is crimped on with a crimping tool that effects the seal of plastic to the reverse curl opening. This closure is available as described here with an inner bead for lined drums and also is available without this inner bead for containers that have either bag liners or discs for fiber containers.

The next closure I would like to discuss is our flexible spout closures. First, the large spout which I'm sure you are all familiar with. This is a drawing of the inverse curl with the raw edges of the drawn metal on the inside. It also is available in the reverse curl such as I described previously on the plastic opening. It is available either way, of course, depending on the requirement of the individual packer for a lined or unlined container, and the necessary dies and tooling are available in the various pail manufacturing plants. After the opening has been performed the filler has a 2 3/8" opening for easy fillability, and the closure is sealed on by a spout crimping tool. These are available in hand and power operated tools. This performs a hermetically sealed container which is readily and easily opened by the end user for dispensing purposes. All that is necessary is to pry off the metal cap and extend the spout with the two bails that are a part of the cap. Particularly important in the pesticide type container is the nature of this closure in its extensible-retractable performance. The closure folds within itself so all the product stays on the inside. Any contamination on the outside will stay on the outside if the user desires to retract the closure back into the container. Also, of most importance, is that it is not necessary for the end user to come in contact with his fingers or his hands at any time to the product in the container. The metal tamper proof cap on the closure is made of aluminum and the retaining ring is available in either plated steel or aluminum.

We have several other closures which fit the same 63 mm opening that is used for flexible spouts. These include our self-venting spout as well as our 3/4" plastic fitting and our flexible cap fitting which is for a container which does not require a pour spout but for quick dumping or complete evacuation of the container rapidly. The same crimping tool are used for all closures. As you can see, we are in every way possible standardizing on this opening so that existing tools that are in industry now will be used for any closures that we now have or will come up with in the future. Also, of course, as pointed out to you in our discussion on the plastic closure with a larger opening, if any future closures are designed around that opening, again, it would be so designed to make the existing plastic crimping tools usable on such closures.

While I am on the subject of flexible spout closures, I would just like to briefly show you on the chart the openings for our medium and small spouts. Both of these closures are snap-in type closures. They are not really necessarily geared to the pesticide business, but I just wanted to mention them to you briefly so that you would be aware that these do exist. These closures are available for plastic pails, tin cans, and steel pails. I didn't mention before but I'm sure that you are aware that the large spout can also be used on tin cans, plastic pails, and steel pails.

We have two new closures available this year but are not on the market as yet. One is a screw cap flexible spout and later on this year we will be out with a new closure which will be fitting the flexible spout opening. Rather than take up your time here at this meeting with these closures, I will have a sample of the screw cap spout available at the plastic pail workshop and will be discussing this with the people that will be attending this workshop.

Roy Dunn, who is up here with me holding the charts, will be attending the steel drum workshops and he will have samples with him of the various panels and the drawings that we have discussed here as well as having the pre-set torque wrenches for your further examination. I will have plastic closures at the plastic container workshop.

As was pointed out before, we in the industry are always looking to you people for whatever is required in your industry. Therefore, any suggestions or thoughts you may have in this regard we would be most appreciative of having since this is where the innovations for new ideas in closures must come from. I certainly hope that at this meeting some of this information will be available, and we will do whatever is possible in this regard.

I thank you for your time; and if there are any questions, please feel free to ask.

Raymond F. Ouer is Manager of Sales at Reike Corporation, Auburn, Indiana. He graduated from the University of California at Berkeley, and has been with Reike for 21 years.

TANK TRUCKS

by

Vincent Grey
Department of Commerce
Washington, D.C.

With all the discussion about small containers, I feel like a skunk in a lawn party here trying to talk about large containers used aboard ship and tank cars. But I think these also have to be mentioned in a broad gauge conference like we're conducting here.

When is a coded tank truck required? Products classed as dangerous articles must be transported in tanks that comply with one of the several construction codes established by the Department of Transportation. A code commonly used in the tank truck industry is MC 306. This is a code that covers the low pressure tank for transporting flammable liquids and Class B poisons. Then there is MC 307 which covers an intermediate pressure tank designed to operate at a minimum pressure of 25 psi and used for transporting flammable liquids of higher vapor pressures. (The MC 307 tanks, because they are more heavily constructed than MC 306 tanks, are also permitted to carry commodities that are classified for transport in the 306's.) Next there is the MC 312 code tank truck which covers tanks for transport of corrosive liquids. These 312 tanks are generally built to ASME (American Society of Mechanical Engineers) pressure vessel requirements and have a typical working pressure of 35 psi. Most corrosive liquids must be top unloaded, usually done by putting air pressure on the top of the cargo and forcing it out through a standpipe or a dip tube. Each of these DOT construction codes, 306, 307 and 312, are to be fabricated from aluminum, stainless steel or high tensil steel.

There are two types of vehicles that I would like to speak about: one is the pure tank trailer and the second is the type of motor vehicle used to transport the tank containers that I described this morning.

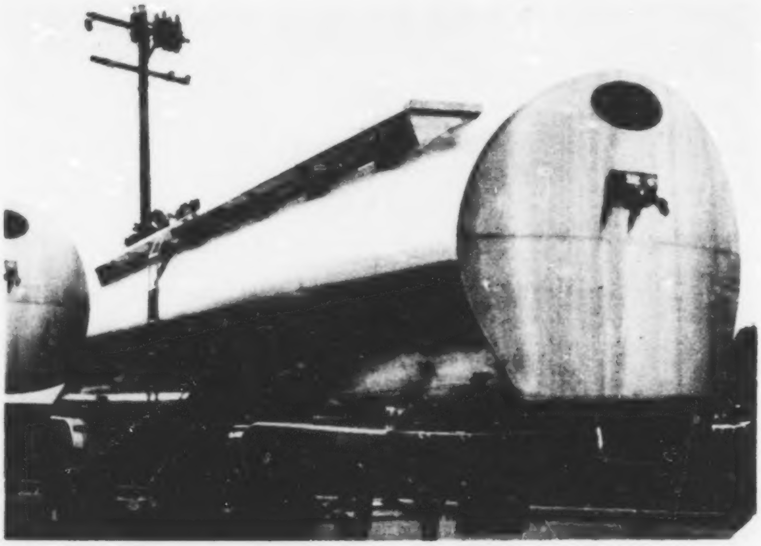


Figure 1

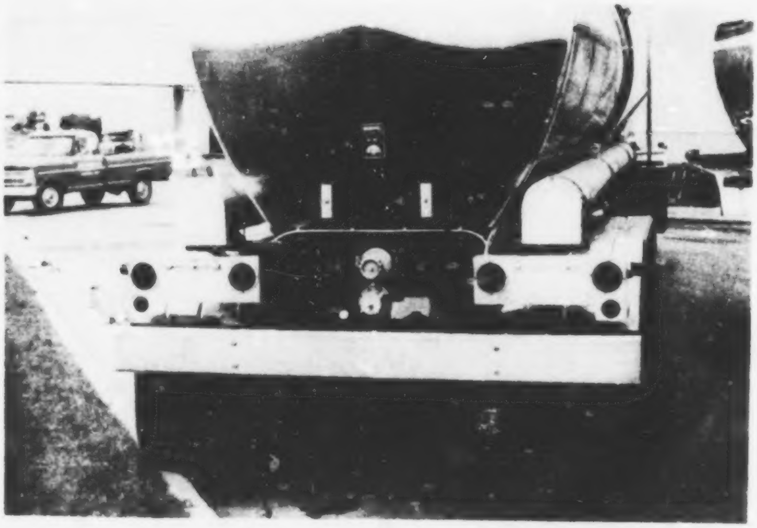


Figure 2

Figure 1, a forward view and Figure 2, the rear view, show a typical MC 307 tank made of stainless steel. The rear also illustrates a place where you can use steam coils for heating the commodity.

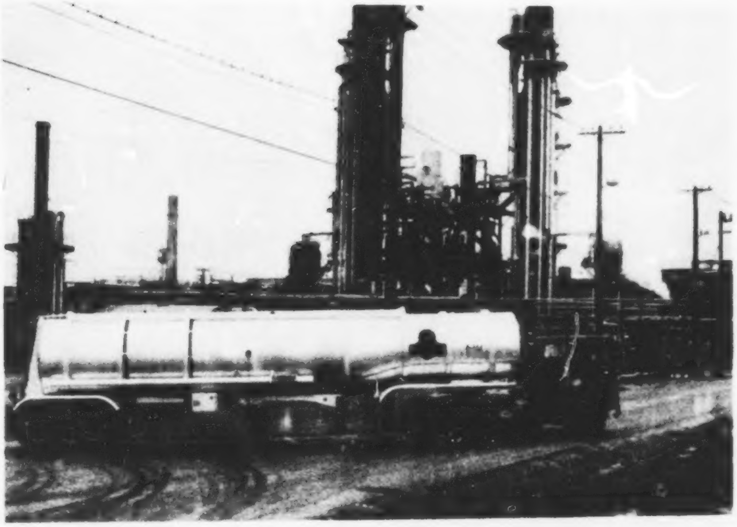


Figure 3 - In Figure 3 we have an MC 312 stainless steel chemical tank, with a drop frame construction. You can see that by dropping the frame, you build up more volume in the main body section than you can obtain above the tractor fifth wheel coupler.

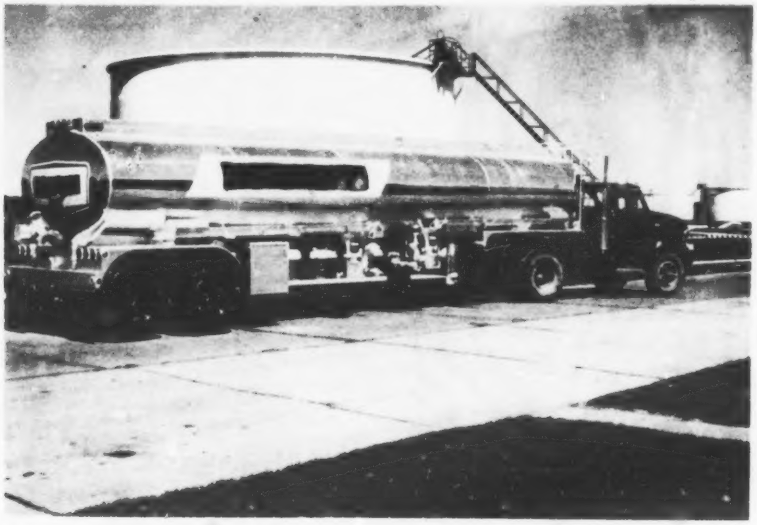


Figure 4 - Figure 4 shows an MC 306 gasoline carrier; all of this is a compartmented tank where you can draw different commodities from each of the tanks. (For a gasoline tank you may carry kerosine or some other compatible product in one of your compartments, gasoline in others, and vary this depending on what type of routing the gasoline units will have for a specific run.)

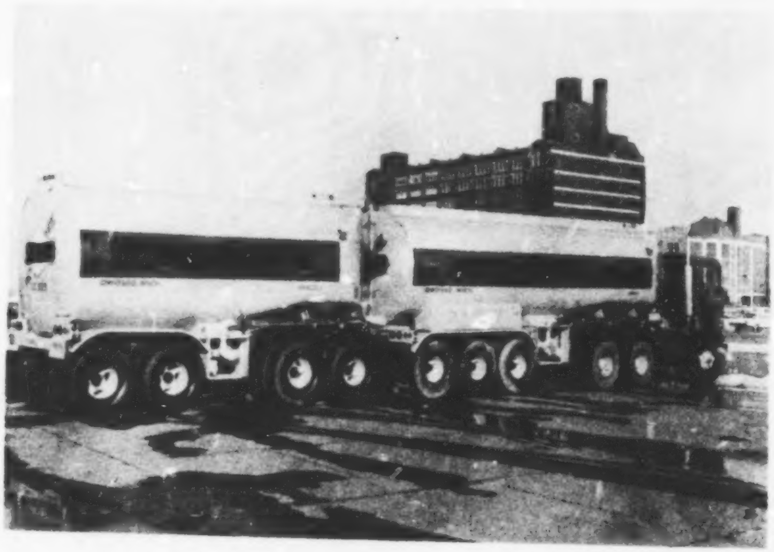


Figure 5 - In Figure 5 is a Michigan train, a double trailer unit. Because of the road regulations in Michigan limiting the amount of load that can be permitted on each axle to 13,000 lbs., the only alternative for the designer is to increase the number of axles. It looks like a centipede and it results in excessive tire wear, too.

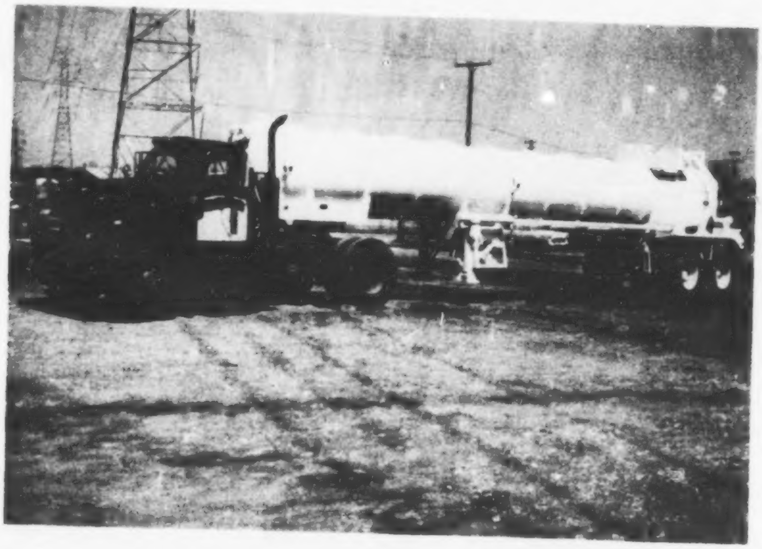


Figure 6 - Here we have in Figure 6 an MC 312 steel. It is an acid tank for high corrosives, where you can see, at the rear end, the dip tube structure where it would be forced into the tank and then force the commodity out through the discharge line. Because of the higher pressure involved here the tanks are never eliptical; they are always round.

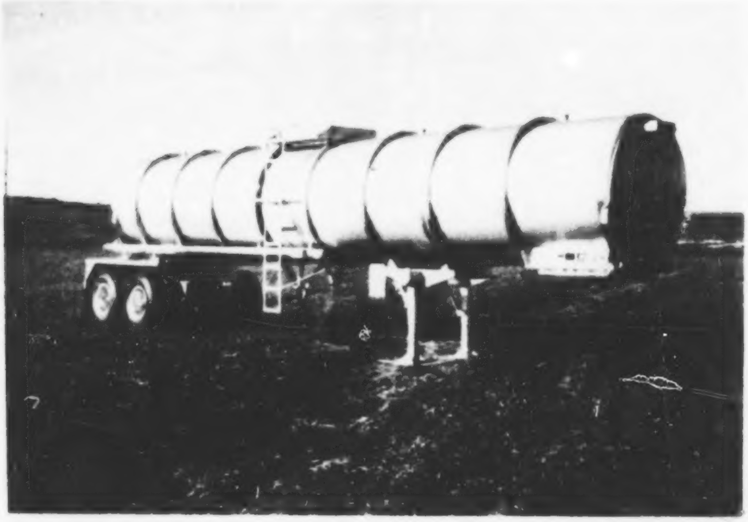


Figure 7 - Here we have in Figure 7 a double conical stainless steel chemical tank. This unit tapers into a common discharge outlet.

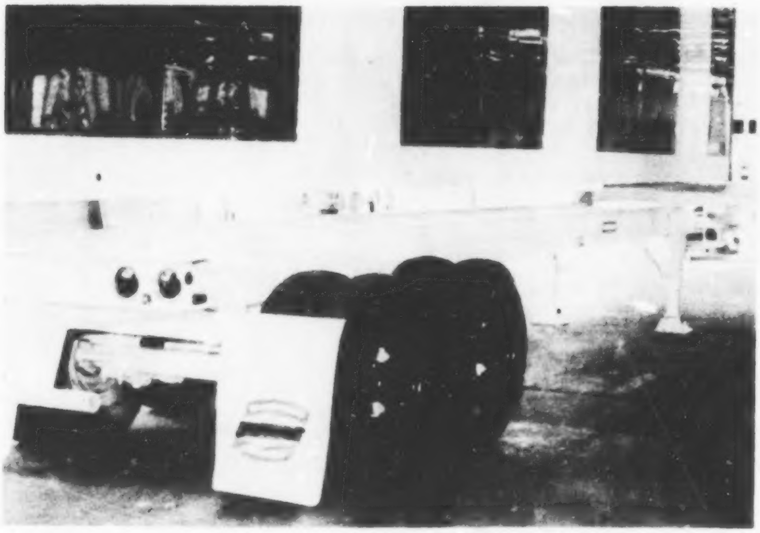


Figure 8 - Now I want to go briefly into the container chassis. Here in Figure 8 you see a container suspended above the chassis frame. To the chassis it is immaterial whether the container it carries is a dry van (as illustrated) or a tank.

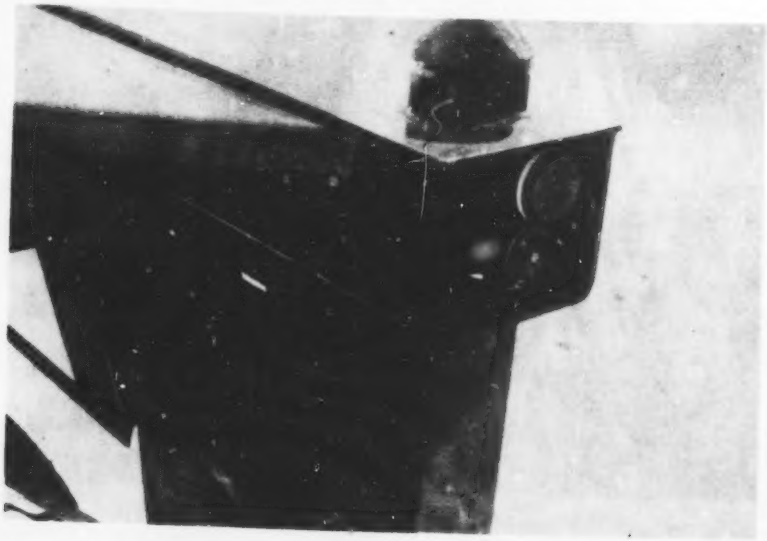


Figure 9 - The twist locks engage the corner fittings of the container and hold the container fast on the chassis.

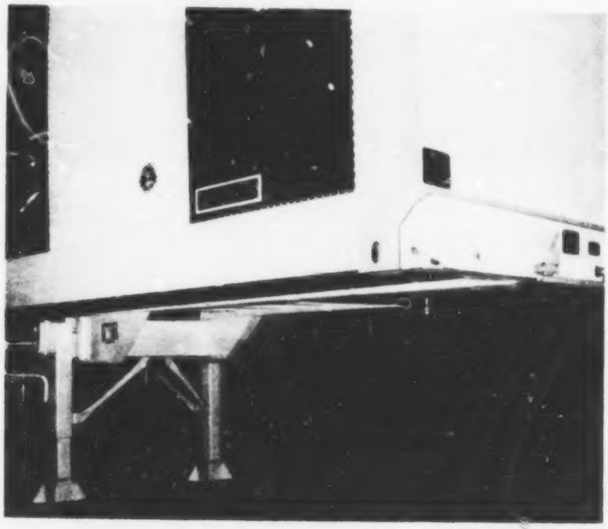


Figure 10 - In Figure 10 you see the kingpin to which the truck tractor will be connected for towing. The container is shown in place, and the only exposed area on the bottom surface is the kingpin.

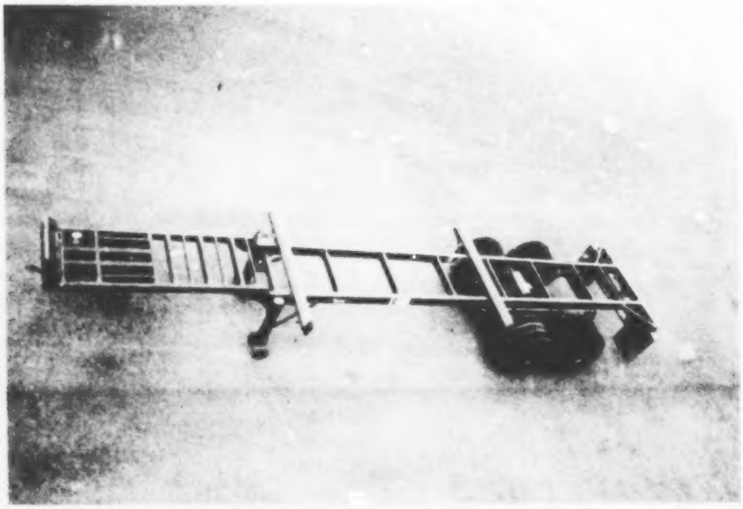


Figure 11 - This is the Sea-Land chassis in Figure 11. They use a different method of attachment and, because it's such a common type of motor vehicle in the container field, it's worth mentioning. Bolsters clamp the bottom of the container out at the outer rail, and pins lock the container in place at the **front and rear.**

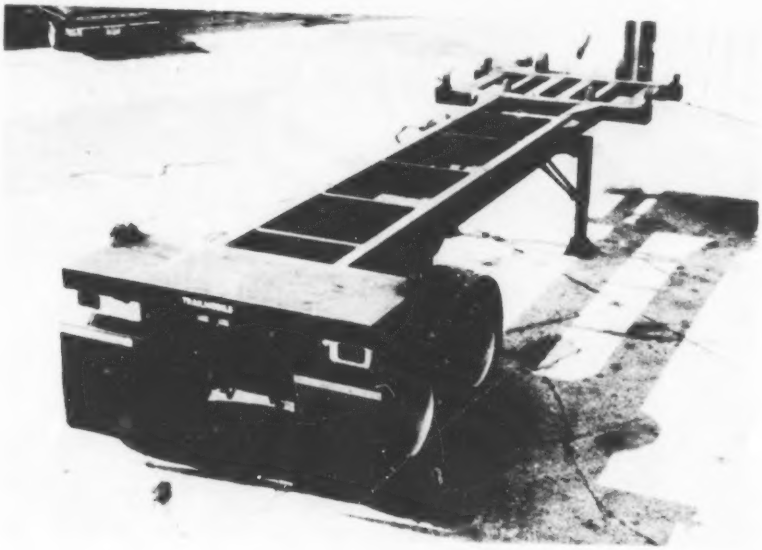


Figure 12 - This is a Matson type of unit in Figure 12. Matson operating out of San Francisco is probably the second biggest U.S. container fleet operator. They are faced with 2 types of containers, the standard 20 and also the one that they originally started with, a 24 footer. Consequently, a unique design is used for both types of containers, one set of securing devices that are on the 20 ft. length interval and another that is on the 24 ft. length interval.

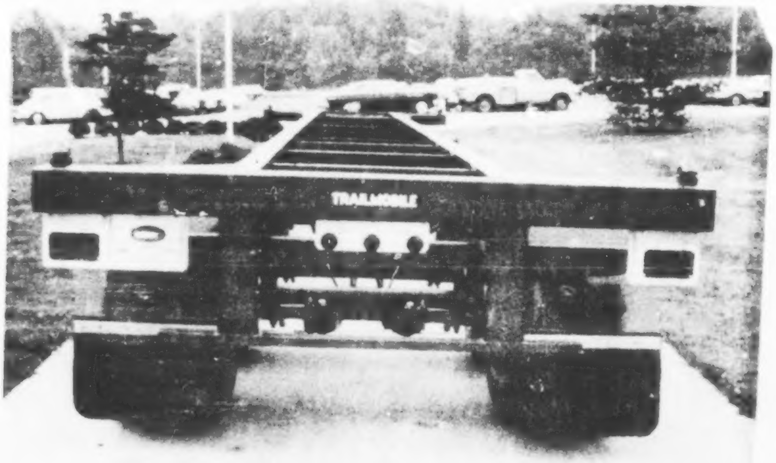


Figure 13 - This is a straight frame trailmobile container chassis. Notice as you view it up the center line here there is no goose neck (drop frame). The twist locks are all on the same plane.

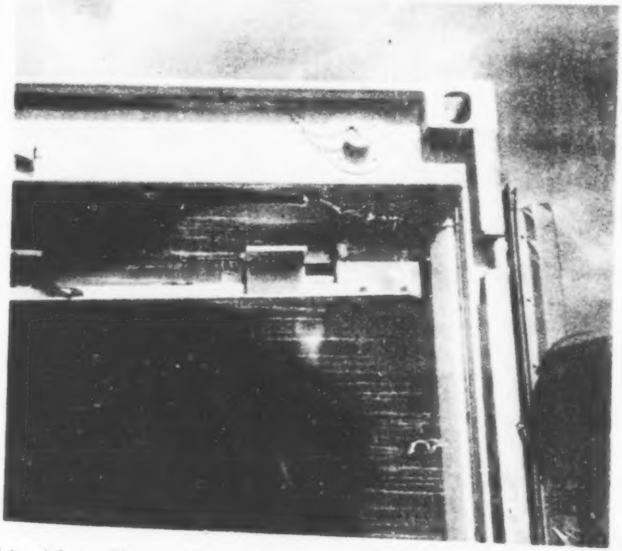


Figure 14 - At the Transpo show, 1972, at Dulles Airport, the U. S. Department of Agriculture showed a brand new concept of refrigerated container. One detail may be of interest. The USDA has provided for the shipment of perishable commodities a method of introducing fumigants into a containerized load. The fumigated air, containing insecticides or whatever might be required by the product as being transported, will be sprayed into the container. A fumigation fitting is located at the rear of the container in the door header (at the top right).

Thank you very much. **90<**

Questions and answers following speech by Vincent Grey

1. Question: Do the MC 306, 307, and 312 cover transport of chemicals as waste?

   Answer (Mr. Grey): I don't think you can classify all waste as one type of hazardous product. If we're talking about nuclear waste material and that sort of thing, you would have an entirely different type of problem from other chemical wastes. Consequently, since the hazards are different for various wastes, the Department of Transportation cannot declare one type of tank to be satisfactory for all purposes. The DOT would have to examine the kind of waste and classify it according to what kind of coded tank would be prescribed. With that information you could go out and get the right coded vehicle. The codes also include DOT 51, which has a minimum operating pressure of 100 lbs. This construction is so heavy as to make it very impractical for routine type of hauling, but for certain hazardous wastes it conceivably could be used.

   When a shipper comes to a motor carrier with a specific product, the carrier will check the hazardous commodity listing which identifies by commodity what DOT code of vehicle or tank is required, and then the carrier will furnish it. Also the carrier must be certified for that particular route for the hazardous commodity involved.

2. Question: There are in existence contract waste disposal firms, and I was very surprised at your reply that there are no standards that could be applied to the return trip for some of these chemical wastes. It seems to me that it's now being left up to the judgment of somebody who is an undefined person as to what to do once the material becomes a waste. You just can't say, "Well, it's a waste now, so we don't classify it." That seems kind of a vague area. What this gentlemen was referring to was a particular concern that specializes in contract waste disposal, but again what are the guidelines for one to decide what type of truck for a particular waste? It's easy when it is in it's raw material form, but on the return trip, it just shouldn't be left up "in the air."

Answer (Mr. Grey): Don't forget now, that what is waste (the word generally categorized as waste) may vary depending on what industry you are talking to. And here is where the problem lies. That's why I say that the Department of Transportation, Office of Hazardous Materials, would have to be given some guidelines as to what kind of waste you had in mind when you asked whether or not a specific vehicle could be employed to carry it. The Special Permit is the technique that has been used for obtaining DOT permission to transport certain restrictive hazardous commodities.

The construction of these vehicles is based on the certain amount of information that comes in from the purchaser. A trailer designer, for example, using a 306 tank, will go to the chart that's published in the DOT regulations to determine what the shell and head thickness should be (that is, those thicknesses acceptable for densities up to 7.2 lbs. per gallon). So if your waste is a heavy waste commodity and you have exceeded the 306 permissible density level, you automatically must select a different vehicle. Selection is the responsibility of the shipper.

STEEL DRUMS

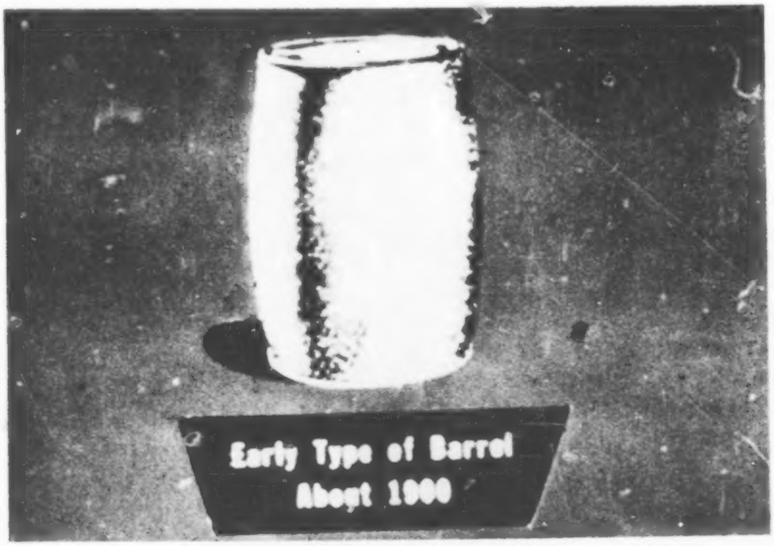
by

Arthur W. Nides
Steel Shipping Container Institute
Union, New Jersey

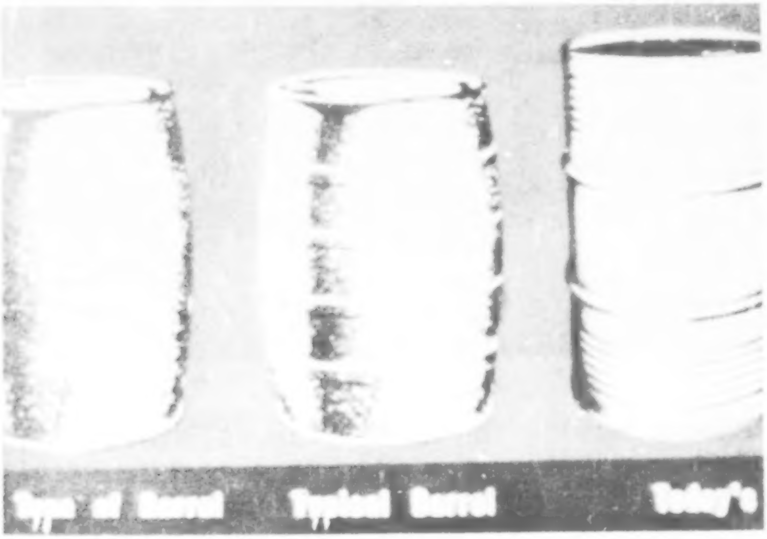
Ladies and Gentlemen, in behalf of the Steel Shipping Container Institute, let me say I am very glad to meet with you today to consider matters of profound concern to us all.

Rather than rely on the usual words of description to inform you about our industry, I thought a brief slide film would get us better acquainted more quickly.

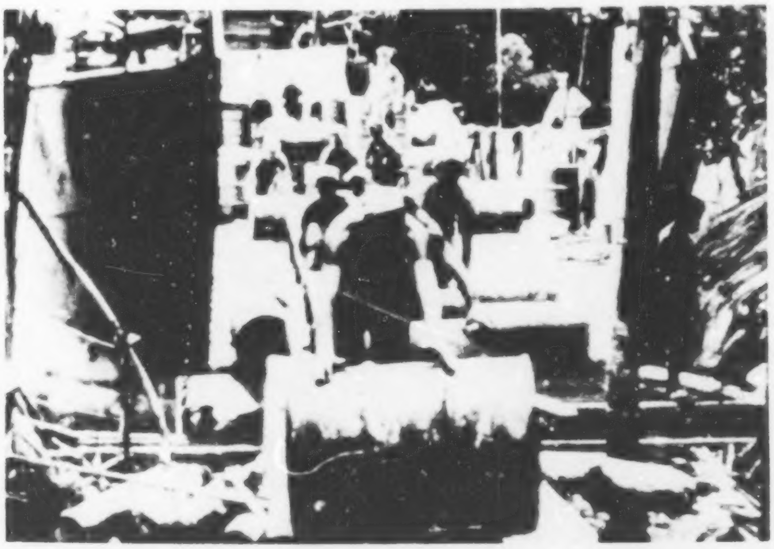
Slide #1 (Oil Barrels) - The wooden barrel, forerunner of the steel drum, was adequate until the discovery of oil in 1859. Here is a small example of the overwhelming demand that the oil rush created.


Early Type of Barrel
About 1900

Slide #2 (Steel Barrel) - Oil also created a need for a barrel that would not leak so much leading to the invention of this container made of steel and introduced about 1902. It, too, had its short comings.


Type of Barrel
Typical Barrel
Today's

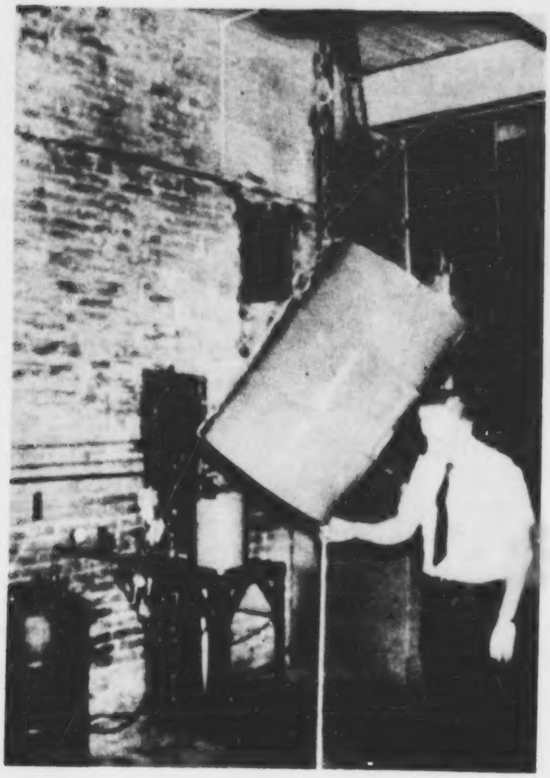
Slide #3 (Steel Barrel) - Between 1902 and 1910 variations of the steel barrel surfaced. The straight-sided barrel with corrugations and rolling hoops met most of the needs until the postwar period.



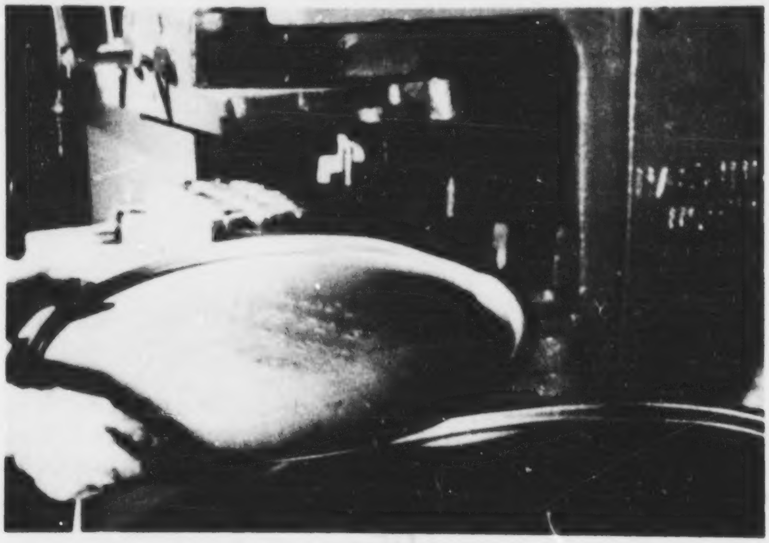
Slide #4 - After the war, research and development was converted to peacetime needs. The chemical industry required clean contamination-free containers for new products. Chemical and mechanical methods of descaling steel were developed. Protective coatings for interiors were also developed to contain hard-to-hold products.

THE STEEL SHIPPING CONTAINER INDUSTRY

Slide #5 - Improvement of exterior decorating techniques and equipment, developed in the 1950's, converted the steel container from an inconspicuous vessel to an attractive economical custom-made package.



Slide #6 (Drop Tests) - In addition to production line pressure tests, new steel drums also must pass periodically the rugged drop and hydrostatic tests to qualify as hazardous materials containers.



Slide #7 (Embossing) - Each new steel drum and pail must be permanently embossed with the name of its manufacturer, the date it was made, the gage of its metal, and the dot specification.

To further familiarize you with our industry and association, I would like to give you a brief statistical profile.

Companies (1)	48
Plants (2)	145
Employment (Thousands)	11.3
Payroll ($Millions)	$65 - $70
Capital Investment ($Millions) (3)	$350
Investment Per/Employee ($Thousands)	$31
Value of Shipments ($Millions)	$400+
Total Production units (Millions) (4)	115

a. Drums: 33 million - size: 13-65 gal.-gage: 14-28

b. Pails: 82 million - size: 2-12 gal.-gage: 22-29

Category of companies: over 80% in Small Business Category

Major Producing Areas: Calif., Ill., N.Y., Ohio, Penna., and Texas (5)

Application of Product: Containers for agricultural and industrial chemicals, oils, solvents, paints, janitorial supplies, food and construction materials (6)

FOOTNOTES

(1) Source - Bureau of Domestic Commerce (BDC)
(2) Source - BDC
(3) Estimated by Steel Shipping Container Institute
(4) Source - Department of Commerce - M34K Series
(5) Manufacturers represented in an additional 21 States within the continental U. S.
(6) Source - Bureau of Census; BDC; Steel Shipping Container Institute

Our association members operate 81 of these plants and manufacture 88% of the total drums and pails produced in the United States.

In addition to these statistics you should know something about the physical characteristics of our industry. (1) We are a high speed production line industry capable of producing low cost fabricated steel products. (2) Practically all of the production line equipment is single purpose. Consequently we must produce a minimum number of diameters and heights; otherwise the die and equipment costs would be exorbitant. In addition to the added costs there is further justification for this. The Petroleum Packaging Committee, headed by Fred Langner, Mobil Oil Company (now retired), made an extensive study 12 years ago of steel pail and drum dimensions and came to these conclusions:

1. As produced today these dimensions allow for economy in steel purchasing.
2. Center of gravity makes for balance, enabling one man to handle. Many consumers of products transported in steel drums do not have sophisticated handling equipment available.
3. Present diameters fit reasonably well into carrier units such as freight cars, ships and trucks.
4. Practically every high speed filling line in chemical, petroleum, and other industries is built to present drum standards.
5. Container industry standards permit the user flexibility in selecting his supplier.

Now to the subject at hand - Our industry had been supplying, for a number of years, containers for the transportation of Class B Poison pesticides and were unaware of any major problems. However, on December 8, 1967, we were invited to a meeting in Washington sponsored by the Federal Committee on Pest Control. The subject was disposal of pesticidal wastes and containers. There were no recommendations or conclusions but all in attendance were made aware of a developing problem. Our industry agreed to participate and make a contribution where possible. However, we needed further clarification of the problem. Remember, the concern regarding all packaging - not just pails and drums - was decontamination and disposal. To my knowledge there was no evidence of inadequacy of any of the approved packages used in the transportation of Class B Poison pesticides.

In the first half of 1968 we met several times with the National Agricultural Chemicals Association and Office of Hazardous Materials, Department of Transportation. Apparently there was a problem but no handle to grasp.

The first positive step forward was taken on September 1968 at a meeting called by Will Jennings, Director, Office of Hazardous Materials, Department of Transportation. In attendance were 21 packaging and traffic representatives from the agricultural chemical industry, 15 representatives of various federal agencies, and 2 from our industry. The reason: a 5-gallon pail had been ruptured and spillage had contaminated the contents of a truck. Because of the atmosphere generated by the deaths in early 1968 in Mexico due to food contamination from Class B Poison Pesticides, the banning of steel containers for the transportation of pesticides was considered. This was clearly a matter of great concern to the agricultural chemical and the container industries. As a result, the National Agricultural Chemicals Association agreed to make an immediate survey of their members regarding container problems, reports of which were to be submitted to a meeting scheduled for October 3, 1968. As a representative of the container manufacturers, I made a similar survey. It showed that our members were completely unaware of any major problems, much less one that could precipitate a crisis of this magnitude. Yet, verbal darts were flying in our direction.

However, the results of the NACA survey indicated the container manufacturers were doing a reasonably good job. Here is what the survey showed:

Size	Containers Filled & Shipped	Failures During and as a Result of Transportation	% of Leakers	Rate of Leakers to Units Shipped
1 gallon	306,400	143	.046	1-2139
5 gallon	363,800	312	.083	1-1170
30 gallon	40,000	49	.1225	1-808
55 gallon	130,300	60	.046	1-1176
TOTAL	840,500	564	.067	1-1490

For our industry a ratio of 1 leaker out of 1,500 units is considered an acceptable figure. In this instance the causes of failure included improperly installed closures, handling in transit, as well as manufacturing defects.

The meeting, although inconclusive insofar as solutions were concerned, was a success. At least the problems were more clearly defined. Also from it came the establishment of NACA's Recommended Container Inspection Procedure and the SSCI's Recommended Quality Control Procedure.

Meetings with interested groups were continued, and although few changes were made, many were suggested. Those considered were:

1. Treatment of interior surfaces of the containers to permit complete drainage. We could do little in this area, as none of the coatings available to us offered much improvement.

2. Eliminate seam where body and bottom are joined. We fully understand that this area may retain some product, but with our present method of manufacture and assembly we cannot eliminate it. However, other processes such as the deep draw would eliminate the seam but only at prohibitive cost.

3. Construction changes to better withstand normal transportation and handling conditions. Our review showed that specifications presently in use satisfy the need. However, heavier gage metal could be used, if desired, at a higher cost. Also, to assist drainage, it was suggested that we increase head convexity and center the pouring spout. Samples were made but, to my knowledge, did little to reduce the residual product.

As you can see, while improvement in the various design and manufacturing specifications could be made, they could be accomplished only at the cost of producing an uneconomical container.

Therefore, in our search for a safer container, the National Agricultural Chemical Association and the Steel Shipping Container Institute turned to vigorous implementations of Container Inspection and the Quality Control Procedures. The results have been most encouraging. For example, the ratio of failure has improved from 1 out of 1,500 containers, to 1 out of 5,000, an improvement of which we feel quite proud. (This will be confirmed by Robert Uncles who speaks later.)

I hope that this necessarily brief account of our various efforts to improve safety has convinced you that we are fully aware of the inherent danger in the Class B Poison Pesticides.

Our purpose for participating in these many meetings continues to be to learn of the problems and aid in finding solutions.

Although we are a relatively small industry and many members are categorized as small businesses, we have available and are using constantly company-operated research and development facilities as well as outside sources such as the Battelle Institute.

We also are a regulated industry. All containers we produce for the transportation of hazardous materials such as Class B Poison pesticides are covered by Chapter 49 of Code of Federal Regulations.

I have stated that, in our opinion, based on documented evidence, our product has had a good performance record. If we can improve on the latest figure of 1 failure out of each 5,000 units, we will of course do so. But, even this record will be difficult to maintain owing to the technological and economic complexities inherent in container manufacture.

Frequently, it has been said that, in the transportation of the material in question, "one leak is too many." I would not for one moment question the intent of this statement, but an economical fail-safe package, to my knowledge, has not been and is not now available from our industry. However, who is to say it cannot be accomplished in the future?

Up to now, we have been discussing aspects of the steel shipping container as a package for Class B Poison pesticides only in relation to new fully-tested steel drums and pails.

RECONDITIONED CLASS B POISON PESTICIDE DRUMS IN CAPTIVE SERVICE.

A suggestion has been made recommending reconditioned steel containers for this purpose. Used in a captive system, wherein the emptied containers are decontaminated and shipped back to the original filler, it is noted that they would not have to be disposed of locally. Therefore, these containers would not add to the solid waste disposal problem. This is clearly a most desirable objective, with which we concur. But, is this idea workable from the safety point of view? For example, consider the decontamination requirement so vital to safeguard the safety of the public, and those persons handling the container on the return trip and during the reconditioning process. Clearly, the decontamination process would have to be 100% effective to offset the hazards of human exposure to residues. Can anyone provide this assurance as a fact? If it can be accomplished, this is fine; however, if decontamination requires removal by incineration above 1100° F, the residue may be removed but the sealing compound is rendered useless.[1/] Gaskets protecting the container's fittings would also be similarly damaged.[2/] This condition should be sufficient to render the drum unfit for further service.

Beyond these concerns there is the question of the structural integrity of the reused container. A drum submitted to the storage and transportation environment is occasionally the victim of rough handling. This can and will develop areas of stress thus accelerating metal breakdown. To avoid this hazard will require very careful examination of each drum before refilling.

Therefore, considering the possible heat damage to the gasketing material, potential metal fatigue, plus the testing and shipping costs, it is difficult to see how the captive reconditioned drum approach to the problem can be considered seriously.

Recycling is the most economical way to dispose of a used pesticide drum and should not be confused with reconditioning. The majority of all drums and pails usually end as scrap metal when they are of no further use as shipping containers, totes, storage bins, or waste receptacles. This is because of a long established industry-financed program which includes practically all industrial metal scrap. The key to its success has been the geographically well located and equipped scrap yards throughout our country. This system

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[1/] The sealing compound becomes brittle at 600° F - decomposes at 800° F - complete incineration at 1100° F.

[2/] Gaskets are completely incinerated at 500° F.

has been so successful that, in the past years, ferrous scrap has accounted for 50% of the United States steel produced. Also, it has achieved two most important goals:

(1) It has in no way burdened the collection system of any community, and

(2) It has contributed to the conservation of a very valuable natural resource.

Of course this system does require, as others do, that the containers be decontaminated.

Arthur W. Nides, President of the Steel Shipping Container Institute at Union, New Jersey, has been with the Institute for six years. Previously, he was employed for 25 years with the Rheem Manufacturing Company, and has had experience in most phases of work in the steel drum industry.

FIBRE DRUM

by

L. L. Mrkvicka
Continental Can Co., Inc.
Fibre Drum Division
New York, New York

The purpose of this presentation is to familiarize you with fibre drums and their place in the shipment of various hazardous materials. Not all pesticides are considered to be hazardous materials and accordingly the fibre drum industry is in a position to provide economically attractive containers for non-hazardous applications.

Today, we will dwell heavily upon drums for hazardous chemical applications.

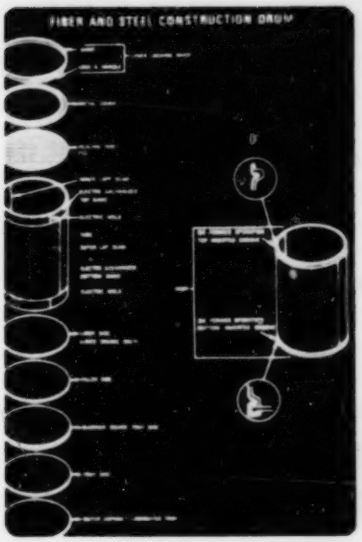
We will display a series of slides that will show the general line of fibre drums, various regulations and specifications, testing, usage, storage and handling.

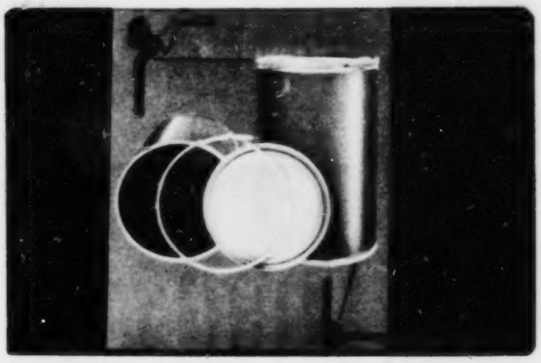
In the interest of time conservation, the Fibre Drum Panel will answer questions at the end of this presentation.

FIBRE DRUMS

Slide 1 - We're going to begin with a general description of the fibre drum and its construction. Basically, the fibre drum is a straight sided, cylindrical shipping container, the sidewall being convolutely wound of kraft paperboard with a variety of headings attached to the sidewall by several different methods.

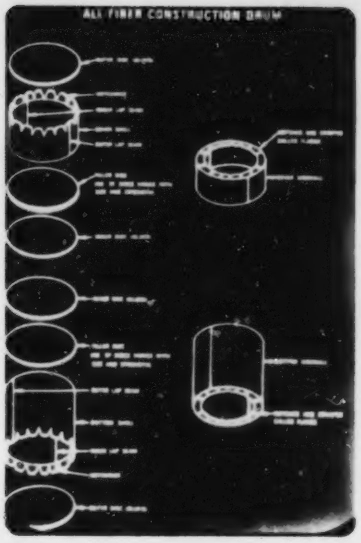
Slide 2 - The type of fibre drum you are probably most familiar with is the construction shown here.



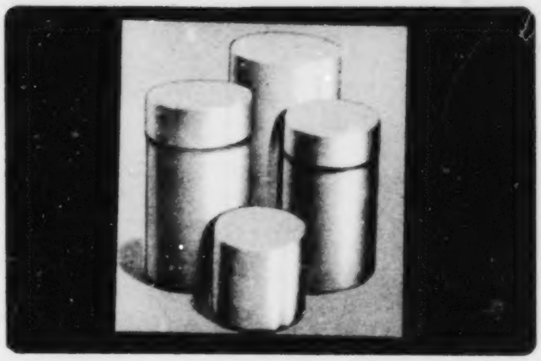


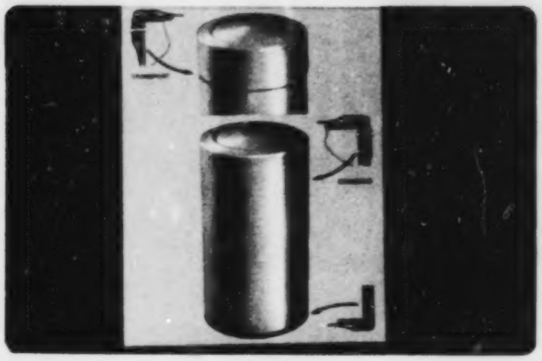
Slide 3 - This drum consists of a fibreboard sidewall with steel chime bands crimped in place. The bottom chime locks the bottom heading to the sidewall by curling the steel firmly around both components and provides both additional strength and a rolling chime.

Slide 4 - The top chime band is crimped around the upper edge of the sidewall to provide a rigid collar to support and secure the cover with a locking band. This chime also adds strength to the overall container construction and allows easy handling.



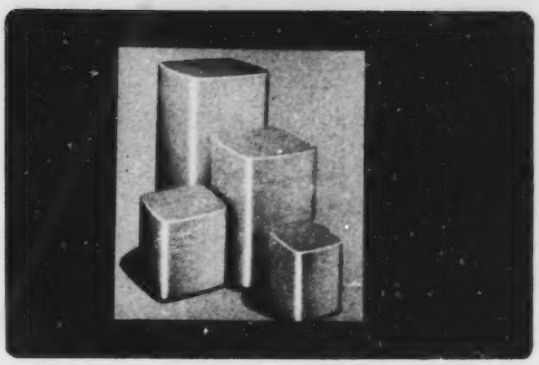
Slide 5 - The other major classification of fibre drum construction is the all-fibre type of drum.



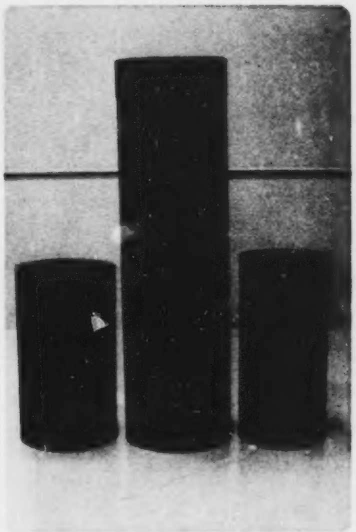


Slide 6 - Although there are many variations in the specific component assembly, the basic unit consists of a convolutely wound fibreboard tube which forms the drum sidewall and a part of the bottom, and a second larger diameter tube which forms a cover. The drum tops and bottoms are attached by crimping the top edge of the cover and the bottom edge of the tube to allow the various discs to be glued in place.

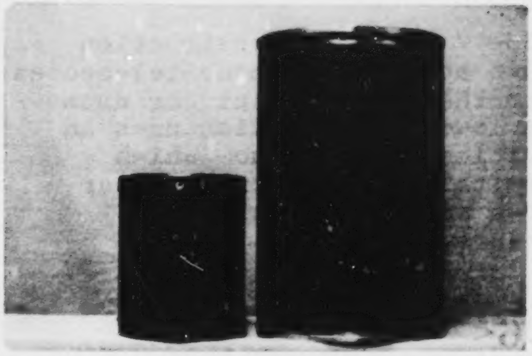
Slide 7 - In the construction shown above, the cover telescopes over the tube to seal the drum. The lower construction uses an additional inner tube which permits a flush fitting cover for a smooth sidewall tape closure.



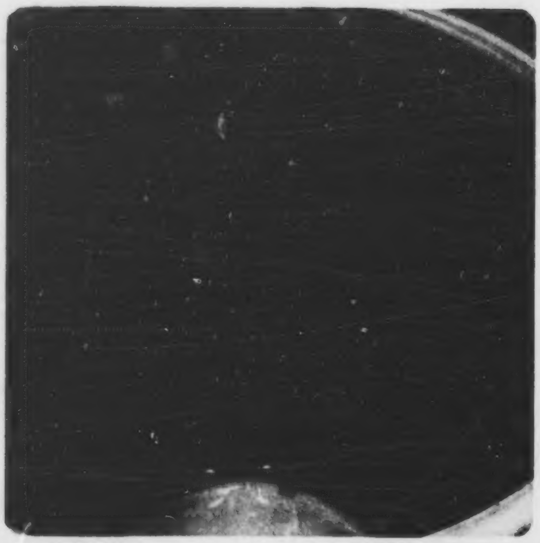
Slide 8 - Shown here is an essentially square version of the all-fibre drum designed to conserve storage and shipping space.



Slide 9 - Using these two basic construction principles, the industry has developed many different fibre drums. For example, some variations of all-fibre drums for dry products are shown here. The two smaller drums are usually used to ship powdered and granular commodities, while the larger drum is most often used to ship rolls of film.

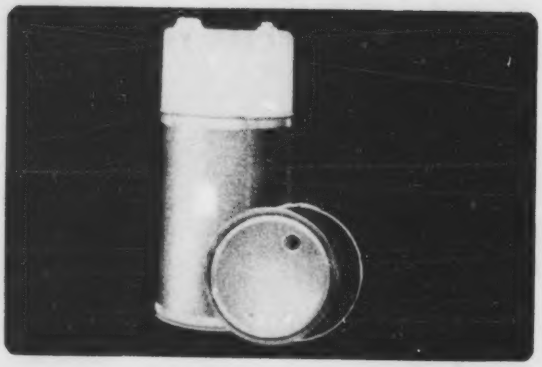


Slide 10 - The combination fibre and steel constructions for dry products. These two style drums are the basics. The larger drum is the more common shipping container, while the smaller drum has the less rigid construction with a crimped or seamed bottom heading and a slip closing metal cover, not recommended for hazardous materials.

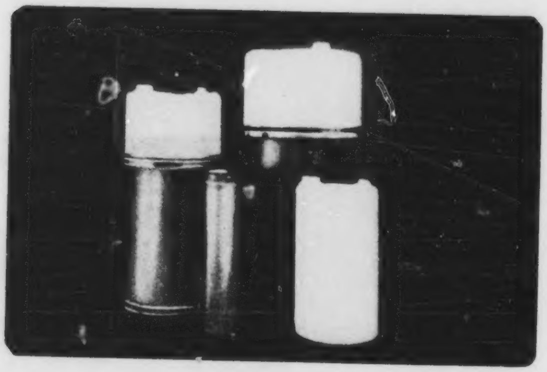


Slide 11

Slide 12

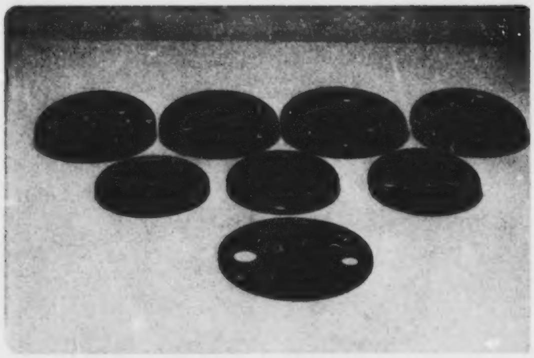


Slide 13



Slide 14

For liquid products, the two basic styles are the poly lined fibre drums where the lining is an integral part of the drum and the composite type where the drum acts as an overpack for a semi-rigid PE insert.



Slide 15 - The number of variations among these styles are increased many-fold when the choice of heading is added as shown here.

Slide 16 - These covers have different coatings, fittings, materials and calipers, each designed for different performance.

Slide 17 - The number of variations are again multiplied when considering the linings and barriers that may be wound into a fibre drum sidewall. These components may be made up of polyethylene, aluminum, asphalt, combinations of these three or perhaps other materials. The purpose of the liners or barriers may be for cleanliness, reduction of moisture-vapor transmission, or holding liquids. The liner shown here is polyethylene extruded upon aluminum with a kraft substrate used primarily for the containing of caustic soda. Then we add to the variables already mentioned, the range of sizes available -- all the way from 3/4 gallon to 75 gallons.

Slide 18 - Finally, the latest variation available in fibre is a weather-resistant drum which may be stored in humid warenouses or even outside for an unlimited time duration. This innovation alone has expanded the usefulness of the fibre drum as a shipping container many fold. The weather-resistant feature is attained by adhesive or coating selection.

The main point I have been trying to make here is that the fibre drum is a most versatile shipping container available to industry.

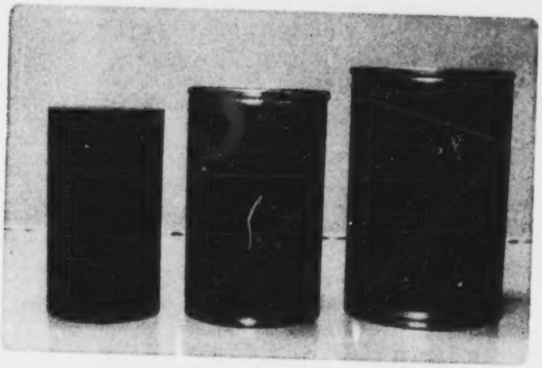
FIBRE DRUMS

FOR

HAZARDOUS MATERIALS

Slide 19 - Turning to an area which more specifically concerns us all, I am going to discuss fibreboard drums used for the shipments of hazardous materials, such as Class B Poison pesticides.

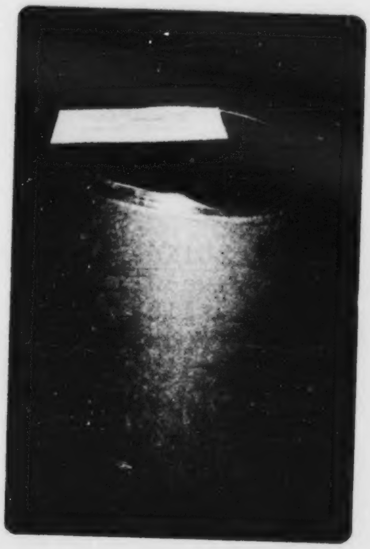
Slide 20 - The Spec. 21C container, is manufactured for the purpose of packaging regulated dry products, as shown in the Code of Federal Regulations. Regulatory agencies stipulate the construction of the drum and include parameters for both the materials which go into the drum and the method of combining the components. Non-hazardous materials are shipped in drums whose constructions are specified by rail and motor carrier regulatory agencies. Hazardous materials must have these containers tested as prescribed by Department of Transportation. These are detailed in the Code of Federal Regulations.



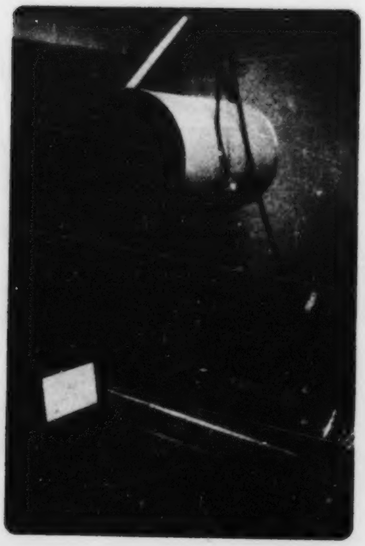
Slide 21 - Both the all-fibre construction and the combined fibre and steel construction drums qualify providing they can meet the performance criterion. Regulatory agencies also designate the physical tests which the fibre drum must meet, after environmental conditioning for 48 hours at 50% relative humidity and 75° F. To qualify under 21C, the drum filled to net authorized weight must be able to pass the four-foot drop test without leakage or serious rupture. There are three different drop tests listed and each drum must be able to pass all of them, limited, however, to one drop per drum.

Slide 22 - Some of these tests we will review now. The first slide shows a four-foot diagonal drop onto a steel faced concrete slab. Here, the filled drum is held in position ready for the drop.

Slide 23 - This next slide shows the drum just after impact on the bottom chime. You can see the slight deformation at the point of impact.

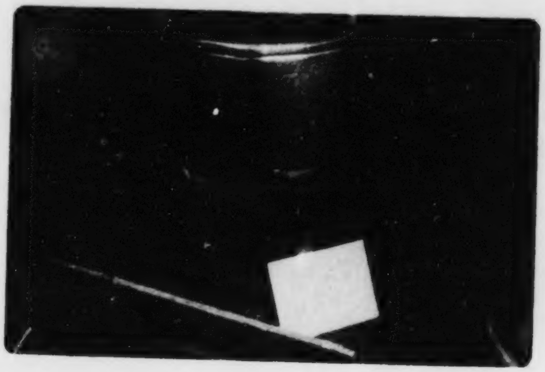


Slide 24 - Here we have a close-up of the result showing the damage -- no product loss and no rupture in the container.

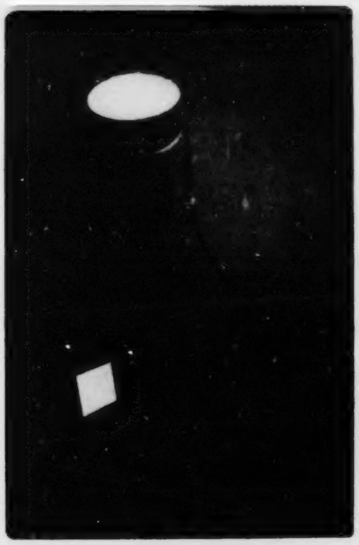


Slide 25 - The next test is a flat drop test across a 2" x 6" piece of lumber. The drum is in position, raised to a height of four-feet.

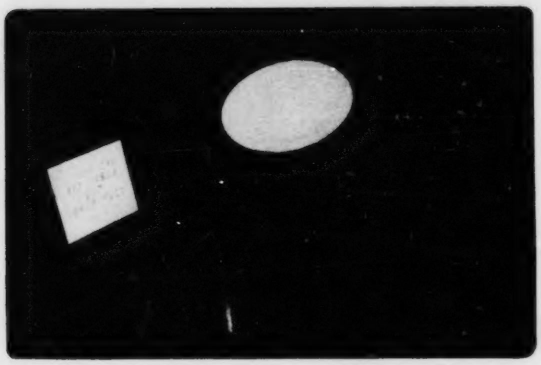
Slide 26 - Here we are viewing the exact moment of impact, and the damage.



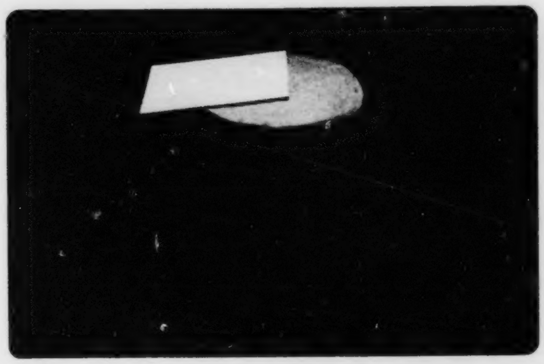
Slide 27 - Note, again, that the drum didn't rupture and, thus, no product loss.



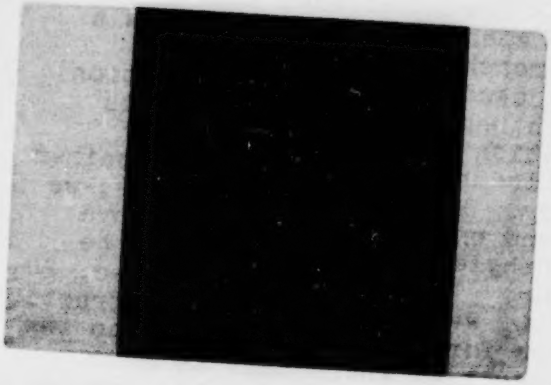
Slide 28 - Let's take another look at the diagonal drop test with an all-fibre type drum. The drum is in the up position waiting for the drop.



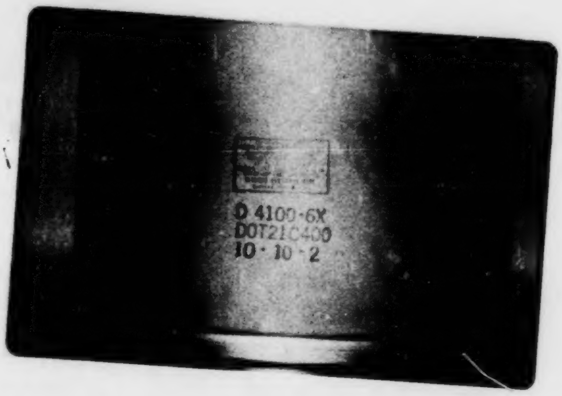
Slide 29 - The point of impact, and the damage, which is also minor.



Slide 30 - The all-fibre type of drum is also required to pass the flat drop test shown earlier with the fibre-steel combined drum.



Slide 31



Slide 32

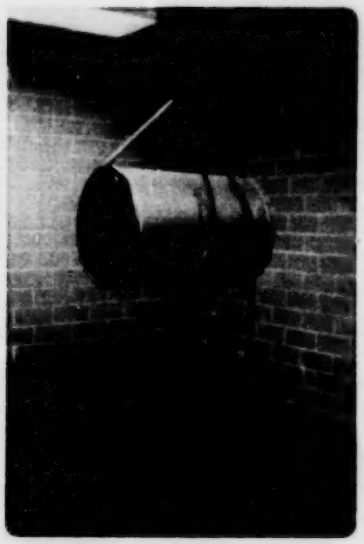
Slide 33

Specification 21C also indicates the marking required on a container which meets the specifications. Pictured here are typical stamps showing the registered symbol of the various manufacturers that are registered with the Department of Transportation. The markings DOT-21C are followed by the net weight classification of the particular container construction. Under DOT regulations, even though the container manufacturer usually marks the drum, the shipper bears the responsibility of seeing that the net weight and container specifications are met for the product package. Therefore, he must thoroughly familiarize himself with these regulations.

Slide 34 - The other type fibre drum listed is spec. 21P. This drum is a fibre overpack for a polyethylene container used for the transportation of certain regulated liquids. This specification also describes the construction required for the container to qualify. However, in this case, we have viewed only half of the picture: the polyethylene insert must also be considered. Turning to either spec. 2U, 2S, or 2SL, we find not only construction parameters for the insert, but also the performance test which must be made. These tests are written for the completed package, that is, the insert secured inside the overpack. The drop tests for this container are conducted from a height of four feet, and are again terminated on a concrete slab. The containers are filled to 98% capacity and are subject to the series of flat and diagonal drops (one drop per container). I have a series of 21P drop tests to show you, starting with the diagonal. In this slide the drum is raised to a height of four feet and waits in position.

Slide 35 - Next the drum is descending toward the slab, and (Slide 36) finally the drum at rest after impact. In this case, the drum actually balanced in this position. Note that there is little damage and no product leakage.

Slide 36



Slide 37 - The next series is a four foot flat drop. The drum is positioned for the drop ----

Slide 38 - Just prior to impact.

Slide 39 - Just after the impact -- note the stress pattern on the bottom of the drum, Again, minor damage and no leakage.

Slide 40 - Here is a closer view showing the deformation -- but no rupture. These tests are to be conducted under ambient conditions as well as under zero degree Fahrenheit conditions. A special liquid is utilized in the drums when conducting the latter tests.

Slide 41

Slide 42

Specification 21P also describes the markings required to indicate that the drum conforms to the construction and performance criteria. Examples of these markings are shown here. Again, the overpack manufacturer must show his DOT symbol, the fact that it is a DOT-21P specification drum, and it is constructed for a specific maximum net weight. The composite assembler, however, is responsible to show the type insert which is integrated into the container (2U, for example).

In this case too, the shipper bears the ultimate responsibility of matching his regulated commodity with the proper container, and again must therefore be familiar with the regulations.

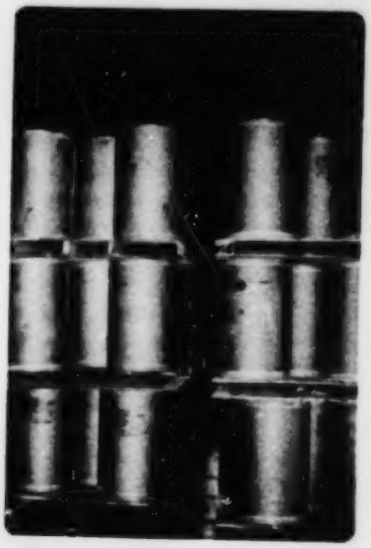
To briefly summarize the use of fibre drums in the shipment of hazardous materials, spec. 21C is the dry product drum and 21P, with 2U, 2S, or 2SL insert, is the liquid composite container. Each container is authorized for certain but not for all regulated commodities. As in any packaging selection, each item must be investigated individually, consulting the commodity list for the authorized package.

FIBRE DRUM HANDLING AND STORAGE

Slide 43 - I'd like to conclude this presentation by reviewing a few handling and storage techniques which maximize utility of the fibre drum.

Basically, most of the equipment made for handling other types of drums can be used on fibre drums with the exception of some of the devices which grip the drum only on the sidewall: particularly, those with a very narrow pad.

Slide 44

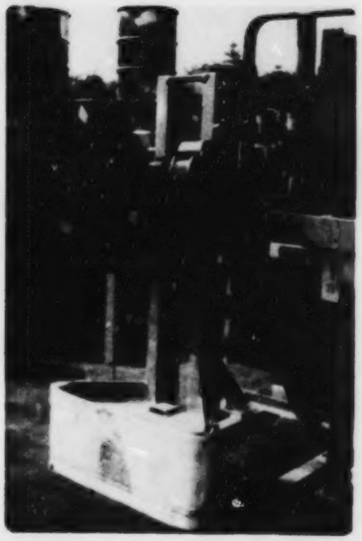


Slide 45

In addition to rolling drums on the bottom chime band, drums can be handled with the use of the pallet. Palletized fibre drums can be easily moved and stacked by fork-lift truck. They can then be stored 3 and 4 high to maximize space utilization.

120<

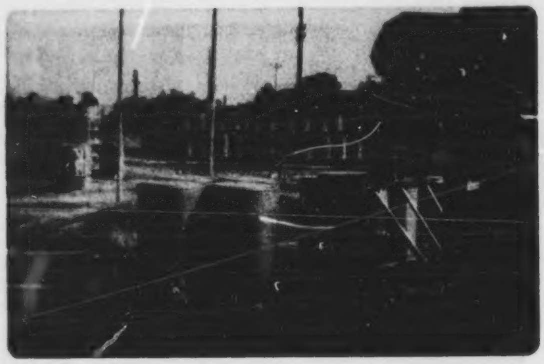
Slide 46 - In these shots, each drum contains 600# of aluminum powder.



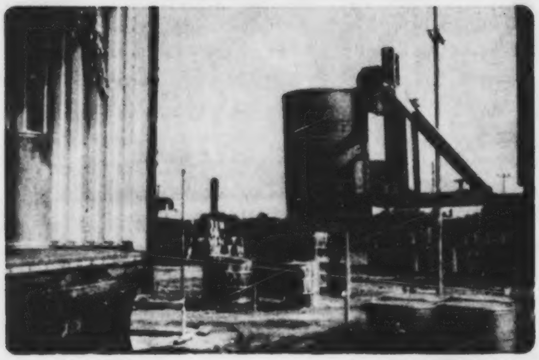
Slide 47

Slide 48

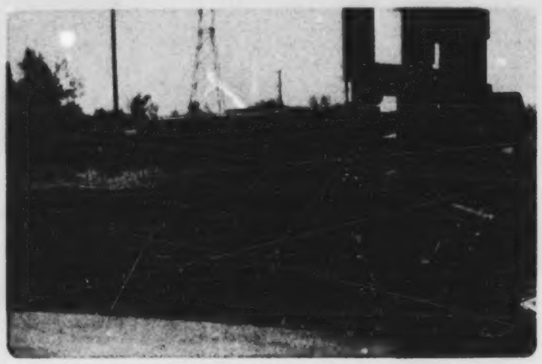
With common handling equipment such as this parrot-beaked lifting device, fibre drums can be stacked without pallets. Please note the all important support pad on the lifting device intended to protect the sidewall of the drum. Note also that drums handled in this manner should have the interlocking cover described earlier to fit into the bottom recess of the drum stacked up on it.



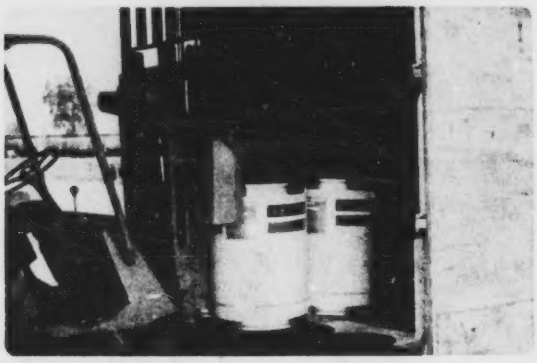
Slide 49 - This equipment can be used in conjunction with pallets when the load requires mechanical aid.



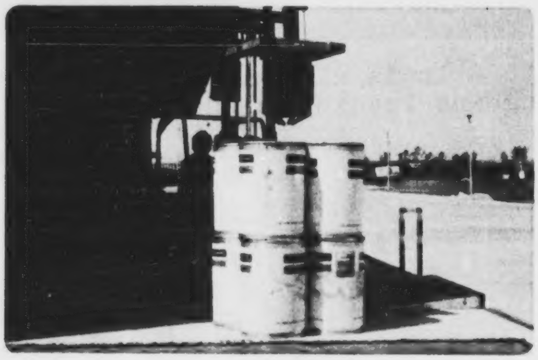
Slide 50 - It is also useful for individual handling and loading as shown in this picture.



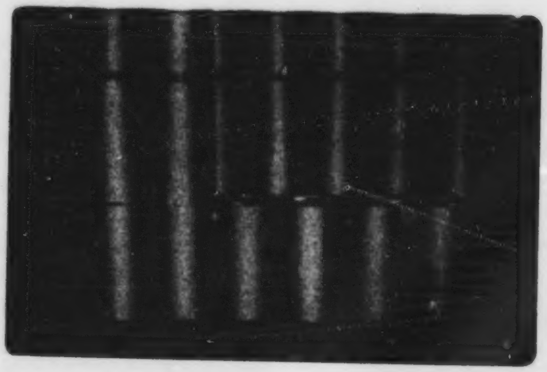
Slide 51 - More elaborate versions of this equipment handle 2 and 4 drums at once, several drums can be



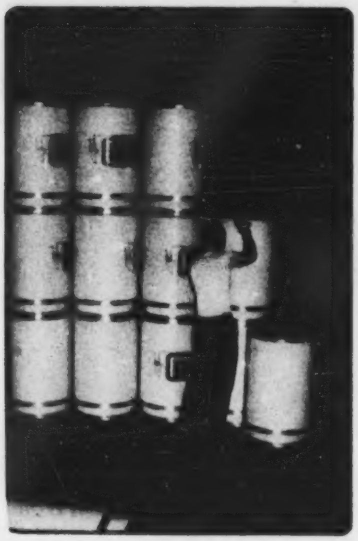
Slide 52 - lifted, transported, and



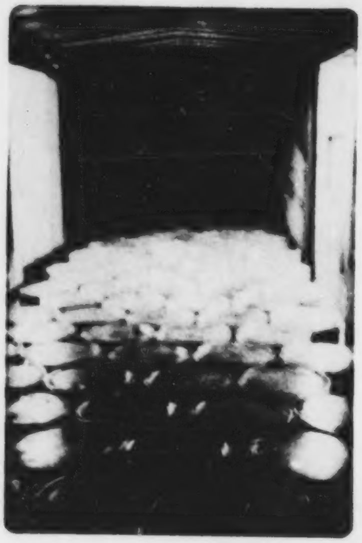
Slide 53 - stacked.



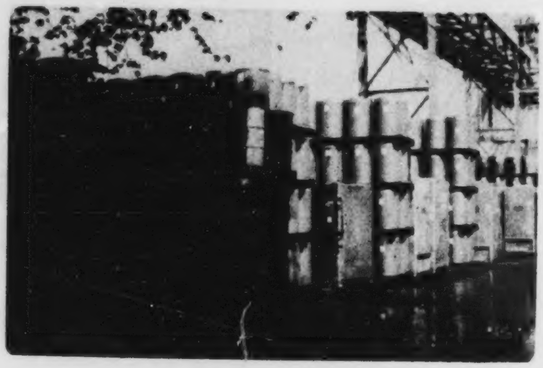
Slide 54 - In loading fibre drums, the smooth sidewall allows tight loading patterns with little override possible in rail cars and trailers. By "staggering" rows of the drums, a minimum of space is wasted.



Slide 55 - Optimal loading patterns are readily developed as drums are stowed



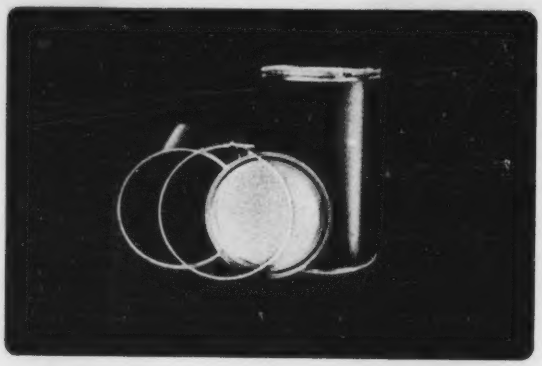
Slide 56 - for transport.



Slide 57

Slide 58

Finally, the weatherproof feature now available in fibre drums minimizes storage costs by allowing both empty and filled fibre drums to be stacked and stored outside during the 4 seasons. A domain which was once restricted from fibre drums, scenes such as this are now commonplace. The major barrier -- weather -- has been conquered.



Slide 59 - Thus, the fibre drum is a very unique form of packaging. It has the qualities of strength, rigidity, resiliance and versatility through variations of construction and a broad range of sizes.

The fibre drum industry has many packages to serve the pesticide industry.

Louis L. Mrkvicka is Manager, Quality Assurance and Technical Services in the Fibre Drum Division of Continental Can Company, Inc., New York. His experience spans 18 years in can and fibre drum manufacturing prior to his present position which he has held for two years.

PAPER CONTAINERS

by

C. G. Peterman
Paper Shipping Sack Manufacturers' Association, Inc.
Scarsdale, New York

By way of background or perspective I'd like to give you a brief recap of who Paper Shipping Sack Manufacturers' Association, Inc. is; the parameters of our industry; and how we fit into the pesticide container discussions at this excellent conference.

As industries go we are relatively small. The multiwall part of our industry - those bags with three or more walls in their construction and of a size to carry 25 pounds or more of a commodity - represent about 350 million dollars in sales. Over 3 billion of these bags are produced each year by about 100 manufacturing establishments located in thirty states.

A paper shipping sack should not be confused with a grocer's carry-out sack nor any sack of lesser ilk. A shipping sack is just what it says it is - it holds a product while being shipped. It does this by being made of a much stronger, better grade of kraft paper than a grocer's sack, for instance, in combination with many other specialty materials to meet the individual demands of the commodity to be packed or the packing customer.

A shipping sack is one other thing - sometimes it is a one-pound sack, a 5-, 10-, or 20-pound sack and sometimes a 100-pound size. The key word is "shipping." In the smaller sized bags, while there is trouble in defining some markets, materials or constructions, we suspect there exists another $150 million dollars worth of business each year with the federal government and commercial customers and several billions more sacks.

In the multiwall area alone over 34% of all sacks are sold to the chemical industry. This includes, of course, fertilizers and many dozens of other generic commodity categories. In fact, it is often said that anything you use, eat, wear or buy, at one time during its travels to you - travelled in a paper shipping sack. I guess when you consider commodities like flour, sugar, salt, cement, pigments, etc., this is true. It doesn't prove anything, however, as it relates to our subject today.

In the shipment of pesticides, fungicides, herbicides, inoculants, fumigants, defoliants, etc., all types of paper shipping sacks are used. For those of you who are unfamiliar with them, the basic sack types have been the traditional four (sewn valve, sewn open mouth, pasted valve, and pasted open mouth). In the very recent past another type of sack is gaining in popularity and use in many industries. It is called a "pinch-type" sack, deriving its name from the way the ends of the sack are formed. Rather than sewing all of the plies of the sack together at the ends or pasting them together to form a stiff hard-to-manage closure, the pinch-type sack has a stepping pattern at each end of the sack. This is accomplished by cutting away parts of the inner plies of the sack in a very precise pattern so that when the closure is made, each ply is folded over and adhered to itself, one after the other, from the outside ply to the inner ply. The results are a much improved package, in that the ends of the sack are sift-proof; they are stronger than the body but are flexible and pliable like the rest of the sack, and the entire package fills out with the commodity inside to a rectangular, box-like shape - easier to palletize, handle, ship and warehouse.

Pesticides shipping sacks use all five types of multiwalls. The sophistication of their constructions depends upon the demands of their contents. Recent innovations make shipping sacks a logical, less costly package than metal cans or drums. Packers who have not taken a hard look at shipping sacks in the past 24 months should do so. Major technological breakthroughs have been made, overcoming former objectionable features. A brief review of major developments in our industry might be interesting to pesticides packers who have not considered the critical technical improvements in paper shipping sacks in the last 2-10 years.

Multiwalls (3 plies or more) were first developed in Chicago after World War I (about 1924). Closures then were either sewn or pasted in the simplest form. The ends of the sack were not sift-proof, nor were they as strong as the sack body.

From 1924 until the late 1940's asphalt and wax were the only barrier materials used. Both had their problems in extreme hot or cold conditions. In 1948 or 49 polyethylene extrusion coating was developed and began to replace asphalted or waxed plies in certain markets.

In the late 1950's extensible kraft paper was introduced to the multiwall business. This sheet has additional stretch and in many cases improved impact resistance was obtained with lower total basis weights in packages.

Not until the early 1960's was a polyethylene film ply used in a multiwall, and shortly thereafter our industry developed the capability of heat-sealing the inner poly ply.

It was during this 1962-63 period when a major breakthrough occurred: the development of the "pinch-style" closure. For the first time multiwalls had ends that were as strong as the sack body and at the same time had sift-proof closures.

One major problem remained that kept multiwalls from competing with metal cans, steel and fibre drums, blow molded bottles, etc.: the bag ends were stressed under heavy impact and other adverse handling conditions.

In 1967-68 this final problem was overcome when the ends of pinch-type bags were made with a heat seal that is not stressed during handling and shipping.

As recently as mid-1970 a further, major package improvement was made to make multiwalls even more competitive with other more expensive packaging materials. This improvement incorporates an inner ply of free film which is attached to the next outer paper ply only at the ends. The body of the free-film inner ply is completely loose, with the attendant strength advantage this implies. In addition, a "turnover" longitudinal seam was developed that added more strength to the seam area by reducing shear stress. The seam adheres poly to poly instead of poly to paper, and the manner in which it is done reduces stress on the seam.

Thus, in the last 10-15 years a plain all flat kraft multiwall through the advent of such major changes as use of extensible paper and positioning free film as the innermost ply has now become the best, most flexible, lowest-cost package in price-performance in the packaging galaxy.

Shipping sacks, by the way, have two very big and very important advantages when it comes to shipping pesticides:

1. There is no other package on earth that has the flexibility in construction when you consider the myriad of materials that can be incorporated with paper in making the bag, the many basis weights and mil thicknesses that it can offer, the styles

and types of sacks used, the great number of closures available to packers, and the low cost when considering total price-performance of your packages.

2. Unlike many of the competitive packaging materials used to pack pesticides, shipping sacks are surefire one-way containers. Their package integrity is lost when the package is opened and the contents emptied. There is little danger in the reuse of a shipping sack, and disposability is almost automatic with users, after the sack is emptied. This is not so with many plastic, glass and metal containers. Ecologically, paper shipping sacks present fewer disposability problems than most other forms of packaging.

Shipments of a wide range of pesticides demands an equally wide range of paper packages. While it is impractical and impossible to cover here the hundreds of sack sizes and constructions used, it might be well to point out the major problems in shipping pesticides and review the bag features and materials used to satisfy those problems.

Depending upon the need for moisture protection, how hygroscopic the product is, whether it is toxic, whether odor is a problem, or whether the product is a rather harmless low-concentrate commodity, multiwalls are tailor-made to fit the need.

In the following, you'll pardon my use of trade or brand names, and my ignorance of the ingredient statements on the myriad of insecticides packages sold by our members.

I have with me today samples of multiwalls or sack constructions. All of these bags contain one or more of the following specialty plies to give the proper organic vapor barrier, moisture or odor barrier, and additional package strength:

PE - Foil - PE - Kraft
Saran Coated Cellophane
Cast Polypropylene
PE Film
PE Extrusion Coating on Kraft
Asphalt Laminated Kraft
Wet Strength Unbleached Natural Kraft

For the most part, sewn constructions use a flat or extensible tape with a cotton filler cord and cotton thread. On pasted bags the proper adhesives, including a range of thermoplastics, are used in accordance to the product packed. Considerations on adhesives are, or course, the amount of oil in the commodity or the product's chemical composition that could affect the integrity of the package.

Special features are often added to the package. For instance, in multiwalls such things as easy-open devices are used. This might be a pull tab or string that automatically tears open the end of the bag. "PE overprint" is another feature, which consists of polyethylene applied over the outer printed surface to protect the brand printing while adding moisture protection. The turnover seam, the pinch-type closure, and the completely heat-sealed inner poly ply are other special features.

Several of the four-pound sized packages I have with me have patented features. One interesting feature is the bottom of the bag (which is also patented) and the inclusion of a booklet giving additional instructions for the use of the product packed.

Once again, these smaller bags can be made by most manufacturers with the ends and back seam completely heat sealed for positive sift-proofness, and odor and moisture protection. Turnover seams and other special features are also available on small bags. You'll also note that many small bags utilize a white or bleached outer ply. Many of them are embossed for greater package protection and stacking ease. The commercial advantages of a bleached outer ply are obvious.

In summary, all of the sizes, constructions, closures and special features of shipping sacks add up to the name of the game: good sift-proof inexpensive package for pesticides, and one that is easily disposed of and won't be inadvertently used by consumers.

I am fortunate in my Association to have a very close working arrangement with the top management and the technical and production management of our entire industry. I would like to offer our collective service to anyone in this room who might want to know more about paper shipping sacks, or who might help us to help serve our governmental and commercial customers.

Thank you.

Charles G. Peterman, Executive Vice President of Paper Shipping Sack Manufacturers' Association, Inc., is also Executive Director of the National Refuse Sack Council, Inc., which he founded in 1963. He graduated from Albion College and did graduate work at Michigan State University. Besides being active in community affairs in Chappaqua, New York, he holds important offices in the American Society of Association Executives, New York Society of Association Executives, and the Technical Association Pulp and Paper Industry.

GLASS PACKAGING FOR PESTICIDES

by

Leonard Steiner
Kerr Glass Manufacturing Corporation
Lancaster, Pa.

Good afternoon. Before I begin my presentation, let me take a moment to give you a little background on the glass industry's involvement in the pesticide industry.

Over 90% of the domestic glass container manufacturers are members of an industry trade association known as the Glass Container Manufacturers Institute, often referred to as GCMI, and my company, Kerr Glass Manufacturing Corporation, is a member of GCMI. I will be talking with you today as a member-company representative of GCMI.

This afternoon, we will take a quick look at the impact on glass bottles and jugs in the mid-1970's by recent federal legislative proposals affecting packaging. My remarks will be primarily addressed to the household size glass-packed liquid insecticides. We will take a quick look at the package changes that will be required to meet the more controlled marketing conditions for liquid pesticides as well as the design, specification and packing consideration required to meet the demands for "special packaging" of household pesticides which will be required under the Poison Prevention Packaging Act of 1970.

The pesticide industry has used glass jugs and bottles for packaging liquid pesticides since the very early days of producing pesticides in liquid form. As the pesticide industry has grown over the years, and more and more pesticides have been marketed in household size packages, the use of glass bottles and jugs has increased substantially. The excellent properties of glass as a container material for liquid pesticides has continued to make the glass container a very desirable package. However, as the market for household sizes of liquid pesticides continues to expand, the need for lightweight shipping packages as well as unbreakable shipping packages continues to grow in importance. The glass container must be improved to answer the challenges of tomorrow in order to make it a viable container for the future packaging of pesticides. Increased national emphasis on consumer protection and consumer product safety will also play extremely important roles in determining the shape of glass packaging in 1973 and beyond.

The glass container and closure manufacturers will be responding to the pesticide industry's need for improved containers. The development of plastic coated glass containers is one potentially meaningful answer to providing a virtually unbreakable package for pesticides. This development will allow the manufacturers and packers of pesticides to ship a lighter weight container, thus saving freight while virtually eliminating breakage in shipment and down time on the production line. Additional savings will also be potentially available through the use of less costly corrugated shipping cartons. This very significant development will be discussed in greater detail by Mr. Harold Zink of Owens-Illinois Glass Company in the Thursday morning session on November 30.

In the past, the glass container design possibilities available to the manufacturer and packer of liquid pesticides has been restricted only by the imagination of the package designer and the state of the art in manufacturing glass containers and glass container molds. A great variety of shapes have been potentially available to the pesticide industry in past years even though generally the standard round-shaped container has been used for not only the retail store package, but the industrial size package of liquid pesticides, herbicides and fungicides. However, in 1973 the pesticide manufacturer and packer will be affected by new regulations governing for the very first time the container shape, style, label graphics, type of package, and potentially even the color and scent of the product. While the labeling of pesticide packages has been regulated to some degree in the past, there has never been a time in the history of packaging that the total package will be so completely controlled. Along with these regulations come many very important considerations concerning the type of glass container finish, the glass container shape, the closing device, and manufacturing tolerances that will become prime considerations to manufacturers and packers of fungicides in the selection of a new package as well as in the evaluation of his existing packages.

The first new federal law whose impact will be felt in 1973 by the pesticide industry is the Poison Prevention Packaging Act of 1970. The Food and Drug Administration has already proposed child protection packaging standards for household package sizes of insecticides, fungicides and rodenticides. This proposal was first published in the Federal Register on Thursday, September 14, 1972 in Volume 37, No. 179. When the final regulations become effective sometime in the second half of 1973, household size packages of insecticides, fungicides and rodenticides will require "special packaging" as defined in the Poison Prevention Packaging Act of 1970. As proposed, the packaging standards for pesticides would include liquids packed in containers of less than one gallon and solids packed in five pound containers or less. The specifics of the Poison Prevention Packaging Act and its application to the pesticide industry will be covered more completely in the Wednesday morning session by Mr. Henry L. Verhulst, Director, Division of Chemical Hazards, Bureau of Product Safety, Food and Drug Administration.

Another proposal by the Food and Drug Administration under the Poison Prevention Packaging Act of 1970 recently published in the Federal Register, Volume 37, No. 202 on Wednesday, October 18, 1972 will also establish the labeling and copy as well as graphic requirements for any packages which are exempted from the child-resistant packaging requirements of the Poison Prevention Packaging Act of 1970. Under the PPPA there are provisions made, under certain conditions, for an exempt household package size to be produced for use by the elderly as well as the handicapped. This may only have very limited application to you, the manufacturers and packers of pesticides, but it is nevertheless a point that will have to be closely considered in evaluating present packages as well as in the consideration of new package designs by the pesticide industry.

The design considerations for pesticide packaging will be further influenced by another federal law proposed by the Food and Drug Administration in the Federal Register, Volume 37, No. 218 on November 10, 1972 under the Federal Hazardous Substances Act. When implemented this regulation would limit the use of:

1. Any container shape, label style and label graphic normally associated with food, drugs and cosmetic products in the packaging of hazardous substances intended for household use.

2. Certain opening devices such as pull rings and tear tabs that are normally associated with beverages and other foods.

3. Certain other types of containers such as gable top carton type containers used for milk and beverage products.

4. Product scents, flavorings and colorings will also be closely scrutinized when used in conjunction with hazardous household substances.

Manufacturers and packers of pesticides will have to closely scrutinize all of their existing household packages of not only liquid pesticides, but dry pesticides in light of the new packaging regulations being proposed. In addition, it will be very important to take a quick inventory of changes that need to be accomplished in label, product color, package shape and package type in the case of child-resistant packaging so that plans can be made quickly with the suppliers of packaging materials to insure that supplies are available in time to meet the various compliance dates. In most cases, your packaging supplier can help you to arrive at a suitable package change that will comply with the presently proposed packaging regulations. However, we cannot overstate the need to start the package evaluation now, so that suppliers can have at least eight to twelve months in which to deliver the packaging changes. This is particularly true when complying with the child-resistant packaging requirements of the Poison Prevention Packaging Act of 1970.

The restrictions imposed on the design of the package by the newly proposed regulations pertaining to hazardous household substances carry many hidden considerations pertaining to all of the package's components including closures and manufacturing specifications. In the case of the Poison Prevention Packaging Act and its application to fungicides, herbicides and rodenticides, the highly desirable glass container can be maintained for liquid pesticides through the addition of a child-resistant continuous-threaded closure. One such closure meeting the test requirements for child-resistant packaging under the Poison Prevention Packaging Act of 1970 is manufactured in various sizes from 20 mm through 45 mm. These CR-I Child-Resistant closures are two-piece plastic and plastic construction in which the lining material can be changed to suit the compatibility requirements of the product. The material from which the inner closure is manufactured can also be changed to meet the requirements of the product.

In the manufacture of glass containers, the continuous-threaded finish is the most accepted and most desirable finish, since the manufacturing tolerances required in glass making are easily accepted by this type finish. The happy feature about the CR-I closure development is that it can be readily applied to existing continuous-threaded glass container finishes. The present day rotary-type capping equipment can be employed to apply this type of continuous-threaded metal or plastic closure.

There are several manufacturers of continuous-threaded child-resistant closures as well as other types of closures in the market place today. When you consider the child-resistant type of packaging and closing system for your glass container, be sure to remember that lug-type glass finishes, snap-type finishes or special fitments and other types of special glass finishes only add to the complexities of holding the proper tolerances in glass manufacturing and tend to further complicate the function of the package. To give you an example of some of the types of finishes and closures that are available, we have brought along a few slides:

SLIDE 1 - Lug type closure

SLIDE 2 - Snap cap type closure

SLIDE 3 - Continuous-threaded type closure

The changes in packaging and the new packaging regulations that will be implemented in 1973 affecting the packaging of liquid pesticides for household use will be taking place in unprecedented numbers. It will be a challenging time for manufacturers and packers of pesticides as well as suppliers of packaging materials to the pesticide industry. There is a great need to work together and plan together now so that the final package changes can be accomplished even ahead of the compliance dates on the various pieces of regulatory packaging legislation being proposed for implementation in 1973. In the area of consumer protection and product safety, not only is the glass package for pesticides responding in the area of child-resistant packaging, but also in the development of a package that is highly resistant to impact damage. Yes, glass packaging for pesticides will be answering the pesticide industry's need for liquid products in tomorrow's market place.

Leonard Steiner is Manager, Testing Services for Child-Resistant Packaging, Kerr Glass Manufacturing Corporation. He graduated from the University of Rochester with a degree in business administration. He has been involved in packaging for 18 years, beginning in Indiana.

CHILD-RESISTANT CLOSURE FOR LIQUID AND DRY PRODUCTS

CR-I

Photo shows a cut-away view of a new "Child-Resistant" plastic cap for both liquid and dry products. The cap operates on a principal of two sets of interlocking ratchets, one set on the sides and the other set on the tops of the closures. The side ratchets engage to provide a positive drive action which allows the cap to be screwed onto continuous-threaded glass or plastic container finishes in the same manner as conventional threaded closures. The cap cannot be removed until the top set of ratchets are locked by the application of downward pressure which is exerted simultaneously while the cap is being unscrewed. Ordinary counterclockwise turning action will not remove the cap. When the closure is properly closed, normal unscrewing action will produce an audible "click," thereby providing a means of testing the closure's child-resistance for both the packager and the consumer.

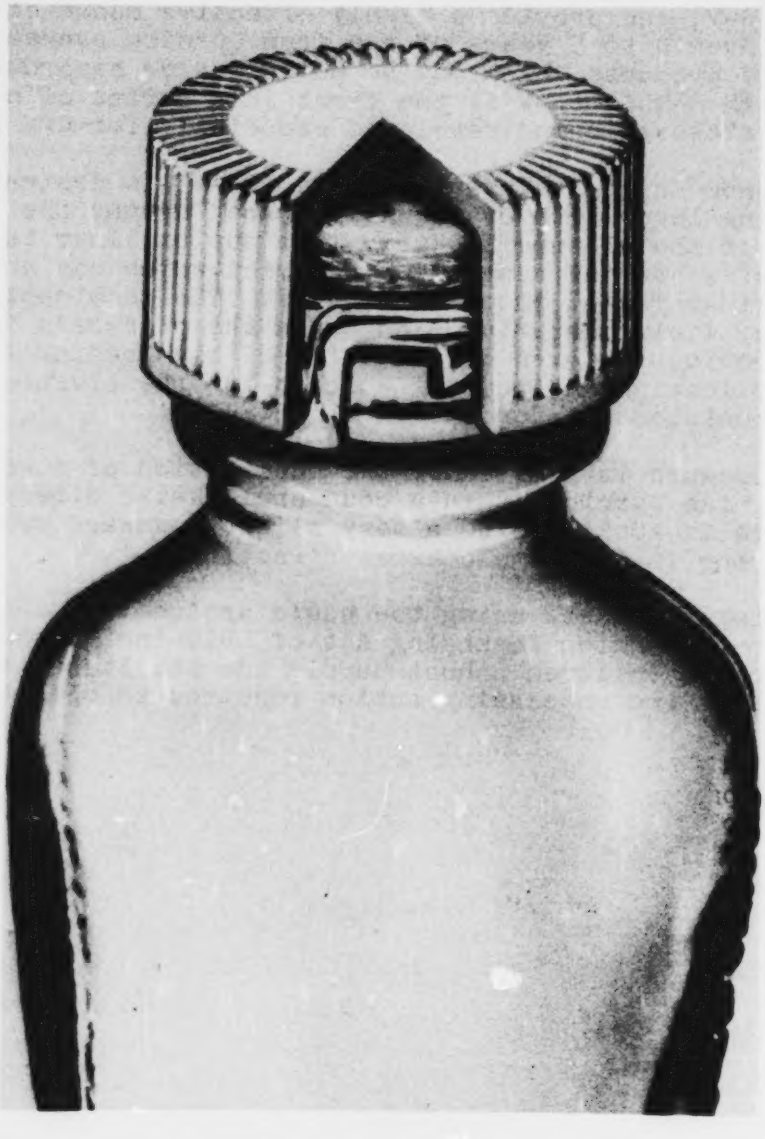
NEW
"CHILD-RESISTANT" LUG CLOSURE
FOR
DRY PRODUCTS

A new one-piece plastic "Child-Resistant" closure with a special duplex liner for both glass and plastic containers which have four-lug finishes has been developed. The closure, known as CR-V, can provide a highly effective means of deterring small children 0 to 5 years of age from opening packages that contain dry products which may be poisonous or hazardous to their health. This CR-V is the first in a series of new Child-Resistant closures being developed especially for dry products.

This new Child-Resistant closure (CR-V) is designed with four closing lugs which are equally spaced around the interior periphery of the closure's skirt. The duplex liner is composed of a special cushioning material which has an FDA approved liner facing inserted over it. The combination of the special lining material along with the closure's four-lug design, provides an even distribution of the loading forces during application and removal which helps the closure to deliver consistent performance.

The closure is removed by the application of downward pressure while turning it in a counterclockwise direction. The closure is applied with a very slight downward pressure while turning it in the clockwise direction.

Preliminary tests using the basic protocol as adopted for the Poison Prevention Packaging Act of 1970 indicates that nursery school children cannot supply the simultaneous downward pressure and unscrewing action required to open the closure.



PLASTIC CONTAINERS

by

John J. Boyle
Consultant and government liaison representative
Oxon Hill, Maryland

What I say here today may not represent the thinking or philosophy of the plastic container industry across the board. Although I think that some of my remarks may well be identified to all types of containers, I do hope it is understood that the views in this presentation are those of one man: one who has been exposed to both the good and the bad in plastic containers over the last twenty years; one who, during that time, has had to enforce specification requirements for those government activities procuring products in plastic containers; one who has had a hand in establishing requirements incorporated in plastic container specifications; one who has represented plastic container manufacturers and users before the government, not (as you might surmise) merely to petition the lessening of requirements in the interests of economy, but to introduce new requirements or strengthen existing requirements in the interest of safety.

I'm certain that all of you acknowledge that plastic containers are the upstarts in the field of packaging. Glass, in one form or another, has been with us as a holding material from the dawn of recorded history. Metals, on the other hand, waited a number of centuries before their use as containers, or holding utensils, was exploited. Contrary to the hoopla of the late forties and early fifties it is an accepted fact that plastics may not be the ultimate answer as packaging materials, but I doubt that anyone will deny that plastics offer the greatest versatility and the widest adaptability of any material, created or invented up to this point in time.

Most of the plastic containers currently being used in the packaging of pesticides were not originally intended for that purpose. They gravitated to that use because of the greater consumer acceptability of plastic containers over other materials, a situation similar to that experienced in other product lines. As in all selling endeavors, the products with the greatest consumer acceptance become the products most widely adopted. In the case of consumer pesticides in packages of one gallon and less, the package rather than its contents became the selling point. Notwithstanding such a sad commentary and at the same time acknowledging that it was realistically dictated by economics, we must face the reality that pesticides demand additional considerations over those of other hazardous products when selecting materials and designs for pesticides containers, particularly those sizes utilized for the products traditionally identified for use outside the household areas.

Without applogy to Mr. Burns and the Office of Hazardous Materials, I do not feel that we must be restricted to those containers presently authorized for the shipment of pesticides merely because they are the only ones authorized by the Code of Federal Regulations, Title 49. Rather I feel that the challenge for safe pesticides containers should be met head-on from the standpoint of overall safety to the population and its environment, and then, if necessary, adjusted to meet the hazards of transportation. It is inconceivable to me that pesticides containers designed from such an approach, rather than adopting those from the household cleaners industry, would fail to meet the requirements of Title 49.

My comments are not offered for the purpose of developing controversy at this session but rather to generate thoughts for discussion at the panel workshop session tomorrow.

We must stand in awe of the ingenuity of the marketing and selling techniques of American business. One can hardly criticize successes such as those witnessed during the "60's" in the field of convenience packaging. One has to be impressed when a small segment of our economy can stampede an entire population away from a traditional, low cost bar of soap and have them begging to buy 7¢ worth of the same soap in a 49¢ container for 89¢. Conversely one has to retreat in dismay when that same segment in approaching the industrial/commercial applications claims container costs as a prime consideration over most all others. It is not my intention to criticize that approach for criticism's sake, but rather to stimulate pesticides manufacturers into rearranging the priorities upon which the development and utilization of industrial/commercial packaging is based.

Return the primary responsibility to the engineering disciplines from the cost accountants and artists, and assign safety in handling, storage, distribution and use higher priorities in determining design and material selection than that assigned to cost. Am I naive to assume that the universal adoption of standard requirements stabilizes container costs and removes that factor from evaluation in the competitive sale of the pesticides?

Packaging presently represents a 20 billion dollar field at the manufacturing level. Unfortunately there does not appear to be a breakdown in the figures to the extent that the dollar value of plastic containers being used in the pesticides area can be determined. Metal, glass, paper, fiberboard, etc. are maintaining their relative positions to each other while plastics are cutting into each of the other material areas at a constant rate across the board. It is likely that the future direction of pesticides packaging will follow the same course.

I'm disposed to believe that as soon as compatibility with a given product is proven, there is a tendency even now to change to the use of plastic containers, particularly in the smaller sizes, because they generally provide the lower cost not only from a production standpoint but also from the transportation standpoint.

I predict that as the technology of plastic containers advances deeper into its second generation, and existing faults and inadequacies are overcome, more and more products will fall into the compatible range. We will see an increase in the trend toward the use of containers composited of plastics and the other materials. We are going to see the use of containers comprised of laminations of plastics and the other materials, and the use of containers of multiwall construction consisting of both single and multiple types of plastics. In addition, I envision a monumental upsurge in the use of coated plastic containers as soon as the current research & development phases of this pursuit reveal the secrets to less costly application techniques of the more expensive materials to the comparatively inexpensive film type plastics.

As this trend develops it becomes more and more incumbent upon the engineering disciplines in the pesticides field to consider safety and disposal in their selection and design of material for pesticide containers with as much commitment as they do on container cost.

It is neither my intention nor my desire to leave you with the impression that current plastic packages do not fulfill the traditionally accepted basic requirements for a package. One point I am trying to make is that where the packaging function in other commodity areas demands specialized skills, the packaging function in the pesticides area demands greater specialization.

The Modern Packaging Encyclopedia defines packaging as, "the use of containers and components, with the addition of decoration or labeling, to protect, contain, identify, merchandise and facilitate the use of products."

After a superficial examination one would adjudge that to be an adequate definition. A definition for pesticides packaging would require elaboration. For example:

1. The authors of the aforementioned definition intended "to protect" to mean that the package had to protect the contents from its environment from the time of filling until its ultimate use.

In choosing materials and in designing packages for pesticides, "to protect" must be acknowledged to mean, in addition, to protect people and the environment from the contents, throughout the life span of the contents.

2. "To contain" is a subtle phrase. In the context of the definition, the authors' most stringent interpretation was intended to be "to hold or restrain the contents from escaping."

In choosing materials and in designing packages for pesticides, "to contain" must be acknowledged to mean, in addition, that the contents to be held or restrained includes the gaseous portions of the compound being contained and that the restraining feature must also prevent permeation.

Could two better areas be selected as endorsements for specific containers for pesticides rather than to adopt containers from other product areas on a routine basis? The poly bottle for bleach protects and contains bleach within the aforementioned definition even though the bleach loses strength through permeation; but the chemical that permeates does not pose any threat to people or the environment. Should fulfillment of the functions as defined be sufficient to adopt it for use in packaging parathion? I think not!

By the same token should a container be considered as satisfying the feature of "to contain" if its fragility guarantees its breaking or bursting upon dropping or other violent impact? Normally overpack offers protection of such containers only during transportation and wholesale storage. When unpacked - BEWARE!

Only recently have we arrived at that point in history where the adequacy of a package is no longer a mere matter of its being adequate to insure its safe transportation. The time is also upon us when the adequacy of a package throughout its life span is being dictated in the interest of a safe environment. The choice of material and design for pesticides packaging must be such that containment is certain during all phases of distribution and use: easy, safe disposal should also enter into that choice. The advancements made in the plastic container industry dictate the abandonment of the traditional approaches. A review should be made of the use of fragile containers to determine whether their retention is in the best interests of all, or whether their retention is solely a matter of honoring tradition and for cost considerations. My exposure over the last few years would lead me to the belief that retention of such containers is based solely on tradition and cost.

I have not adhered as closely to the agenda title as you might have anticipated. In dealing with the plastic containers field, the choice of design is virtually limitless, components have little restriction, and the manufacturing considerations are so multitudinous because of the vast number of types of plastic materials that I felt restriction to the scope of the agenda title would be overwhelmingly time-consuming.

If I have implanted some provocative thinking, I am happy.

John J. Boyle acts as consultant to companies holding contracts for federal procurement and to others as secondary suppliers, and acts as industry-liaison representative with federal regulatory agencies. He graduated as a chemist from Catholic University and did post graduate work in advanced mathematics and petroleum engineering at Temple University and Penn State (Swarthmore), respectively. He has held responsible positions relative to chemical and petroleum products since 1943, with the Houdry Process Corporation, Inspector of Naval Material, Defense Petroleum Supply Center, and Defense General Supply Center.

SECTION V

REGULATIONS AND LEGISLATION ENCOMPASSING PESTICIDE CONTAINERS

Federal responsibilities in the U. S. Department of Transportation, Department of Health, Education, and Welfare, Department of Defense, and the Environmental Protection Agency, and state responsibilities and actions

REGULATIONS OF THE U. S. DEPARTMENT OF TRANSPORTATION AS THEY PERTAIN TO PESTICIDE CONTAINERS

by

W. J. Burns
Director, Office of Hazardous Materials
Department of Transportation

Good morning, Ladies and Gentlemen. I would like to explain the function of the Office of Hazardous Materials (OHM), how the Office relates to other agencies of the Department, and then some of our present activities that may be of interest to you.

For many years the transportation of hazardous materials by carriers subject to the Interstate Commerce Act (rail, motor, liquid pipeline, and inland waterway) has been governed by sections 831-835 of Title 18 of the United States Code. Before April 1, 1967, this authority was exercised by the Interstate Commerce Commission. Since 1958, regulations for the shipment and carriage of hazardous materials by air have been promulgated under the authority of the Federal Aviation Act of 1958, which authorized the Administrator to issue his own regulations or adopt, in whole or in part, the regulations issued by the ICC under Title 18. The shipment and carriage of hazardous materials by vessel is governed by Section 4472 of the Revised Statutes (46 USC 170) which authorizes the Commandant of the Coast Guard to define, describe, name, and classify hazardous materials and establish regulations for their carriage. It also requires him to "accept and adopt," for these purposes, the ICC Regulations, so far as they apply to "shippers by common carriers...by water." Thus, the water carriers are regulated directly by the Coast Guard, but the Coast Guard regulations applicable to shippers were derived directly from the ICC.

The Department of Transportation Act of 1966 transferred safety functions to the new Department of Transportation, leaving the economic regulatory functions with the ICC. Under the terms of the Act, the Secretary of Transportation has delegated the jurisdiction for regulatory safety responsibility to the four modal operating administrations within the Department: The U. S. Coast Guard; the Federal Highway Administration; the Federal Railroad Administration; and the Federal Aviation Administration.

The Office of Hazardous Materials is in the Office of the Secretary of Transportation. It acts as the principal staff advisor to and represents the Assistant Secretary for Safety and Consumer Affairs in all matters relating to the transportation of hazardous materials. The Office also coordinates the Department's administration of hazardous materials safety programs with the objective of promoting uniform hazardous materials regulations.

Since the Department of Transportation Act made no provision for centralized responsibility for regulating the shipment of hazardous materials, a Hazardous Materials Regulations Board was formed to provide a means for the coordinated exercise of the individual authorities. The Chairman of the Board is the Director of the Office of Hazardous Materials. The members of the Board represent each of the modes of transportation. Each exercises his separate authority, but the Board coordinates their efforts to develop a single set of regulations, as far as possible, rather than four separate regulations covering the same subject.

As a result of the diffusion of authority and fragmented approach to regulations, Secretary Volpe intends to reorganize the hazardous materials function within the Department, indicating the need and importance of single responsibility in matters relating to the transportation of hazardous materials.

In the interim, Secretary Volpe has taken action to consolidate and centralize the hazardous materials functions. He has directed the Office of Hazardous Materials to perform the following functions:

1) Preparation of regulations relating to classification, packaging, labeling, shipping papers, compatibility (except with respect to matters solely applicable to a single mode of transportation), and general shipping requirements.

2) Data collection and compliance.

3) Training and education, except for activities peculiar to a single mode of transportation.

4) International liaison, with internal coordination as appropriate.

5) Research and development, except with respect to bulk vehicles peculiar to a single mode of transportation.

6) Surveillance of shippers and manufacturers, and enforcement activities.

One question we are frequently asked about is the application of our regulations to various types of businesses. These regulations apply to "all carriers engaged in interstate or foreign commerce which transport explosives or other dangerous articles by land and upon all shippers making shipments of explosives or other dangerous articles via any carrier engaged in interstate or foreign commerce by land or water." In applying the "interstate and foreign commerce" concept we look to the nature of the shipment and the nature of the carrier. Federal jurisdiction essentially applies from the beginning of an interstate shipment to its final destination, and also to any shipment of hazardous materials transported by a carrier who engages in interstate commerce, regardless of whether a specific shipment is purely intrastate in nature.

In the regulations of purely intrastate transportation of hazardous materials, it is important to note that the responsibility for regulation of carriers is usually assigned within each state to a State Highway Commission, Public Utility Commission, or similar body. For example, the state of Maryland recently adopted the Uniform Vehicle Code thereby adopting our Hazardous Materials Regulations by reference. Very few states have hazardous materials requirements applicable to shippers except by means of carrier tariffs on file with state public service or utility commissions which have virtually no legal force or effect.

Compliance with the Federal Regulations is a significant factor in attainment of a high degree of safety in transportation of hazardous materials. In the furtherance of compliance, three areas of activity are of importance--surveillance, enforcement, and training. My office has developed a framework for these activities, and pursues them to the extent that resources permit.

To the present time, the bulk of the Department's surveillance and enforcement effort has been carried out by the field inspectors of each of the Department's modal administrations. In general, these field staffs, because of a lack of manpower, have concentrated primarily on carrier compliance. A great need exists to implement an expanded program for surveillance of shippers and container manufacturers. In the meantime, and as resources permit, an effort is being made by the Office of Hazardous Materials to conduct surveillance in these areas.

In many cases, the violations by shippers, container manufacturers and carriers that we have discovered are of the unknowing type. There is a general lack of awareness of the regulations, or if knowledge exists, persons are confused by the regulations themselves. Unfortunately, some of the violations we detect, and which we have reason to believe are continuing, are of the knowing type. We are convinced that an augmented surveillance program will go a long way toward correcting these violations by acquainting shippers, carriers and container manufacturers with the requirements of the regulations. However, I can assure you that, when the situation warrants, the Department plans to use every resource available to make certain that the Hazardous Materials Regulations are complied with.

The Department's Hazardous Materials Regulations are contained in Title 49, Code of Federal Regulations, Parts 100-199. This publication can be purchased from the Superintendent of Documents, Government Printing Office, for $3.75 per copy.

Those of you who are subject to these Federal Hazardous Materials Regulations must know and comply with these requirements.

I do not have enough time to even briefly set out these detailed requirements, but you who ship or transport pesticide materials which are regulated as Class B poisons or some other classification should obtain a copy for guidance. Of particular interest would be the parts dealing with shipper requirements including required packaging, marking, and labeling. Covered under the general information and regulation part are "Standard Requirements and Conditions of Special Permits" and "Notification Requirements of Certain Hazardous Materials Incidents." The carrier requirements deal with loading, unloading and securing hazardous materials in vehicles, placarding, and shipping paper requirements. And finally, a part detailing the specifications for shipping containers.

My office has several ongoing activities that might affect your membership. We are developing a Hazard Information (HI) System that will involve new labels and vehicle placards. The new labels are designed to conform to the United Nations' recommendations which uses specific colors and format and a pictorial or graphic representation of the hazard of the material in the package. The proposed new vehicle placards would be essentially the same as enlarged labels except where a multiplicity of small quantities of several classes are in one vehicle. Under this circumstance a newly designed "Dangerous" placard will be recommended. Each label and placard will bear a two-digit number which is keyed to hazard information cards in a manual. This system is intended to furnish emergency personnel with on-the-spot general guidance for coping with accidents, fires, and spills. The numbering system is designed to provide information on the additional hazards of materials in addition to their primary hazards.

In addition to the planned on-the-spot guidance provided by the HI System, the Department is developing an Emergency Response Center for hazardous materials incidents. At the present time, there are several industry response centers that can be contacted. The broadest coverage is supplied by CHEMTREC, a center operated by the Manufacturing Chemists Association in Washington, D. C. This center is working closely with OHM and other Department entities concerned with hazardous materials transportation. The center operates on a 24-hour basis and responds by phone with information and advice regarding accidents involving hazardous materials. The phone number is 800/424-9300. Most of you are, of course, already familiar with the National Agricultural Chemicals Association's Pesticide Safety Team Network which provides a similar service to CHEMTREC, but specifically for pesticides. This Network is currently providing a valuable service in minimizing the effects and risks of injury arising from accidental spillage of Class B poison insecticides in transportation.

Another of our major activities is the processing of reports of hazardous materials incidents. The reports submitted by carriers are put into a computer where the data is recorded for analysis. We are enlarging the pilot type operation which has been operating about two years, so that we can obtain more sophistication in its handling of data. With improved analysis capability we expect to derive information on how well we achieve our goal of safety, where weak spots occur in packaging and operational procedures, and to pinpoint areas requiring modifications of existing regulations or promulgation of new ones.

Our training and educational efforts include conducting seminars and schools for industry and Government safety personnel, compiling and distributing pamphlets and hazardous materials information, personal appearances at associations and safety meetings, publication of a monthly OHM Newsletter and normal outlets such as the Federal Register and the Code of Federal Regulations.

I appreciate the opportunity to present the Department's contributions to safety in this complex and often misunderstood area of the transportation scene.

THE POISON PREVENTION PACKAGING ACT

by

Henry L. Verhulst
Bureau of Product Safety
Food and Drug Administration
Department of Health, Education, and Welfare
Washington, D. C.

The Poison Prevention Packaging Act was enacted by Congress in late 1970 and signed by President Nixon on December 30, 1970. This legislation, which has a wide impact on all packaged products, authorized the Secretary, Department of Health, Education, and Welfare, to require certain products which can cause serious illness or injury to be packaged in child-resistant closures. In 1971 over 4,500 ingestions, by children under five years of age, of pesticide products were reported to the National Clearinghouse for Poison Control Centers. This is 5 percent of the total cases reported. On September 13, 1972 a proposed regulation requiring child-resistant packaging for certain pesticide preparations was published in the Federal Register.

Before proceeding with steps that have been taken to implement the Act, you should know the details of the legislation. The Poison Prevention Packaging Act (PL 91-601) covers "household substances" which are defined as substances customarily produced or distributed for sale, for consumption, or use, or customarily stored, by individuals in or about the household and which are hazardous substances as defined in the Hazardous Substances Act; (1) an economic poison as defined in the Federal Insecticide, Fungicide, and Rodenticide Act; (2) a food, drug, or cosmetic as defined in the Food, Drug and Cosmetic Act; or (3) a substance intended for use as fuel when stored in a portable container and used in the heating, cooking, or refrigeration system of a house.

The Act states that the Secretary, after consultation with a Technical Advisory Committee composed of representatives of consumers, industry, scientists, medical practitioners, and Government, may establish by regulation, standards for the "special packaging" of any "household substance," if he finds that the degree or nature of the hazard to children in the availability of such substance, by reason of its packaging, is such that special packaging is required to protect children from serious personal injury or illness, and that the special packaging to be required by the standard is technically feasible, practicable, and appropriate for such substance.

In establishing such a standard the Secretary is required to consider (1) the reasonableness of such a standard; (2) available scientific, medical, and engineering data concerning special packaging and concerning childhood accidental ingestions, illness and injury caused by household substances; (3) the manufacturing practices of industries affected by this Act; and (4) the nature and use of the household substance.

The term "special packaging" means packaging that is designed or constructed to be significantly difficult for children under five years of age to open or to obtain a toxic or harmful amount of the substance contained therein within a reasonable time and which is not difficult for normal adults to use properly. It is important to point out that this does not mean packaging which all such children cannot open or obtain a toxic or harmful amount of the contained substance within a reasonable period.

So that any household substance subject to a standard may be readily available to elderly or handicapped persons, who may be unable to use such substance when packaged in compliance with the standard, the manufacturer or packer may package such household substance in a single size which does not comply with the standard if he also supplies the substance in packages which do comply with the standard and if the package which does not comply bears conspicuous labeling stating, "This package for households without young children."

If a household substance is subject to a standard, but is packaged in a single size, noncomplying package so as to be available to the elderly or handicapped, and if it is determined that the substance is not also being supplied in popular size packages which comply with the standard, the Secretary of HEW may, after giving the firm an opportunity to comply, require the firm to package such substance exclusively in special packaging complying with the standard. However, he must find after the firm has been given the opportunity for a hearing, that such exclusive use is necessary to accomplish the purpose of the Act.

If a "household substance" is not packaged or labeled as required by a regulation issued under this Act, it becomes a misbranded hazardous substance, food, drug, or cosmetic under those Acts or in violation of the Economic Poison Act, whichever is applicable for such substance.

Each regulation establishing a special packaging standard must specify the date when the standard is to take effect. The Act requires that this date shall not be sooner than 180 days nor later than one year from the date the regulation is final, unless the Secretary, for good cause, determines that an earlier effective date is in the public interest and publishes in the Federal Register his reason for such finding.

The method for evaluating child-resistant packaging was published in the Federal Register, November 20, 1971. It requires a package be tested by a panel of 200 children, ages 42 to 51 months of age. The use of this method has allowed the accumulation of data to establish effectiveness standards. For full details on the test method consult the above publication. Regulations require that the package will resist openings by 85% of the children before demonstration and 80% after demonstration.

On February 16 the final regulation requiring all aspirin containing products be packaged in child-resistant packaging was published. It became effective August 14, 1972. From that date pharmacists must dispense all prescription medications containing aspirin in special packaging. The Bureau of Product Safety, Food and Drug Administration, has asked all pharmaceutical associations to publish lists of packaging manufacturers and package sizes on which data has been supplied to show the package has complied with the standards required for safety packaging. This does not constitute certification of the package by FDA but does assure the user that they have reviewed data on the vials. We expect to continue this pattern for informing industry of packaging availability as regulations covering other categories of products are proposed.

The proposed regulation requiring child-resistant packaging for pesticides was published September 14, 1972. A period of 60 days is allowed for public comments which must be reviewed and either rejected or incorporated into the regulation. The final regulation will then be published. The proposed regulation will cover all products subject to FIFRA with an LD_{50} in rats of 500 mg/kg or less. Liquid containers of one gallon size or larger and powders in packages over five pounds are exempt from the regulation.

Status of Packaging

This meeting is concerned with the packaging of pesticides. Many of you are or will be faced with finding solutions to child-resistant packages for your products. In some cases research and development is in progress which will solve your needs. There will be three basic needs for packaging.

1. Liquids

Much research has been expended on safety packaging for liquids. Several types of closures -- double cap and free-ring type -- have been thoroughly tested for use in some household products and medicines. The major problem in transferring to liquid pesticide formulations is the effect of some solvents on the plastic liners. Research to define compatible systems will be necessary to solve that problem. Some of you are already engaged in this research. Although the supply of packaging for liquids is in tight demand now, it should be readily available by the time the regulation is effective. That will probably be no earlier than July 1973.

2. Aerosols

There are a number of child-resistant over-caps available for aerosol packaging at this time. I would recommend you investigate these immediately so you will have time for full evaluation, yet be able to place your order in sufficient time to insure delivery. Experience in the last few months has demonstrated that waiting until the last minute to order may result in a backlog which could cause you considerable embarrassment.

3. Powders

Cannister-type containers with metal tops which are available should meet the requirements. Weakly constructed packages, particularly bags, which can be easily torn open by a child, will not serve as safety packaging. There also are several companies working on concepts to apply child-resistant reclosable mechanisms to fiberboard packages. You may wish to investigate these.

4. Unit (individual) packages

A number of companies are developing unit type packaging which will conform with the regulations. These have developed by increasing the tensile strength of the materials and developing a special opening point for entering or will require an implement to open. The contents of such a package cannot exceed the quantity recommended in the directions for an individual application. A number of such units can be packaged in a single sale package.

I discussed the "kiddy panel" for evaluating packaging. This is expensive and time consuming. At the present we have a contract with the National Bureau of Standards to develop mechanical test methods to measure the necessary requirements for special packaging. The American Society for Testing and Materials is also working on evaluation methods. They have three subcommittees: 1. closures involving two simultaneous dissimilar motions, 2. unit packaging, and 3. snap caps.

One question has been raised repeatedly by companies as they approach the implementation date -- What about my stock? The Act is very specific in stating that it applies only to packages filled after the effective date of a regulation. You can, therefore, continue to use inventory stocks. We will, however, investigate any company which appears to have stockpiled and take appropriate action if such findings can be substantiated.

Do not expect the packaging industry to come clamoring to your door with massive supplies of safety packaging that will neatly fit the special requirements of your specific products. In many instances you may have to finance the research and development of a design. The packaging industry will devote their resources to research and development only if it appears that there is a mass market which they have a good chance of capturing.

The Poison Prevention Packaging Act will be approximately 2 1/2 years old when you will be required to comply. Some industries had only 20 months. They have pioneered many of the developmental phases. I urge you to move rapidly to eliminate last-minute problems. This will make both our jobs easier.

Henry L. Verhulst, Director of the Division of Chemical Hazards, Bureau of Product Safety in the Food and Drug Administration, has worked in the Public Health Service since 1947, and entered the Bureau of Product Safety in 1970. He did undergraduate and graduate work at the University of Washington in Seattle, Washington.

MILITARY REQUIREMENTS ON PACKAGING FOR TRANSPORTATION OF HAZARDOUS MATERIALS

by

William Jones
Department of Defense
Aberdeen, Maryland

First of all, the Joint Military Packaging Training Center is not a regulatory agency, rather we are regulated. We have an advisory group, made up of members of the Army, Navy, Air Force, Marine Corps, and Defense Supply Agency. We do not set policy, we do not make policy, so consequently what I'm passing on to you this morning comes from one of our governing agencies, again Army, Navy, Air Force, Marine Corps, and DSA. These are the people that we have to satisfy. Now I certainly do not intend to underemphasize the importance of the poison. However, in giving it some thought, the various poisons that we handle in the military just happen to be another category of materials that we are faced with: the packaging, the storage, the handling, the transportation, the whole thing on this. So, yes, the poisons are important. However, they do not take precedence over some of our other dangerous materials.

SAFE
OR
SORRY...

An Introduction to

PACKAGING AND SHIPPING

DANGEROUS MATERIALS

Figure 1

I have brought along with me this morning a portion of a set of slides that I use as an introduction in one of our courses that we give at Aberdeen. I'd like to show them to you because we have many other dangerous materials other than just the poisons themselves. For want of a better title for this set of slides, I entitled it "Safe or Sorry."

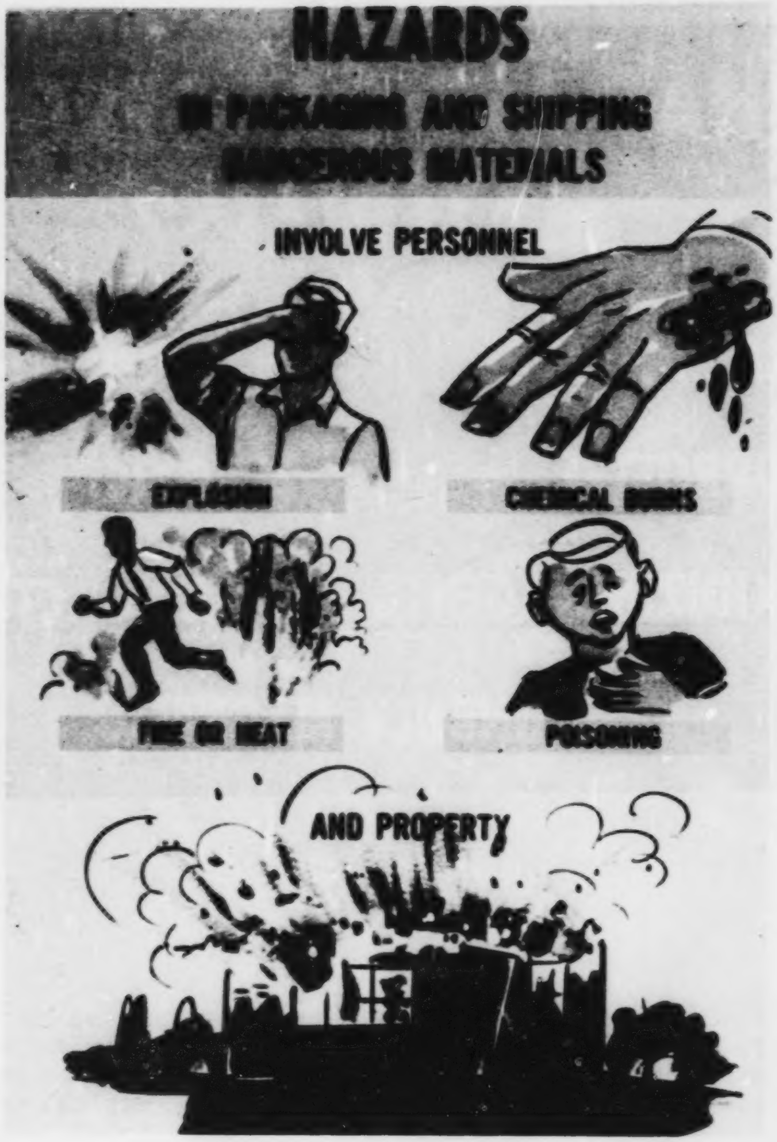
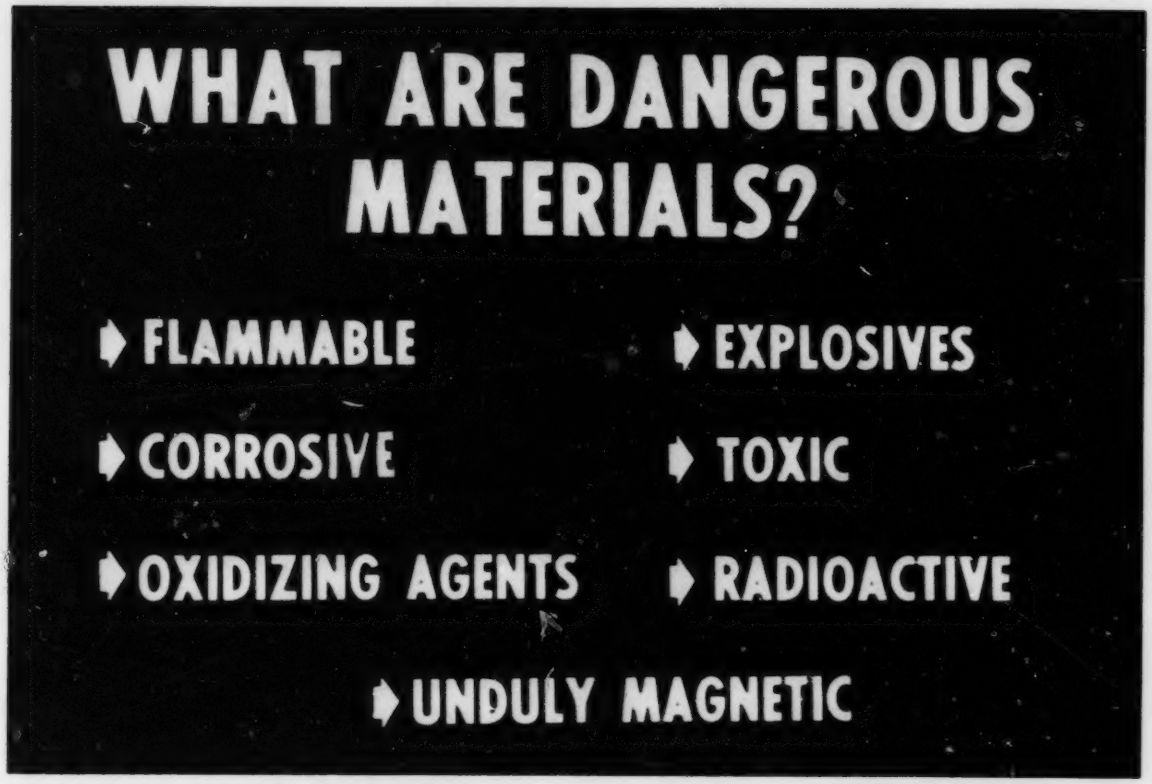

HAZARDS
IN PACKAGING AND SHIPPING
DANGEROUS MATERIALS
INVOLVE PERSONNEL
EXPLOSION
CHEMICAL BURNS
FIRE OR HEAT
POISONING
AND PROPERTY

Figure 2

Ever since man discovered the lethal qualities of certain chemical compounds and incorporated these compounds into weapons, our military establishments have had to cope with the attendant hazards involved in the packaging, handling, and transportation of these materials. An understanding of the hazards involved in these materials is imperative. First of all, the hazards involved can fall in any one of the categories depicted; explosion, chemical burns, burning by fire or heat, poisoning, or a combination of these hazards are involved. Actually, the hazards are primarily personnel hazards.



WHAT ARE DANGEROUS MATERIALS?

- FLAMMABLE
- CORROSIVE
- OXIDIZING AGENTS
- EXPLOSIVES
- TOXIC
- RADIOACTIVE
- UNDULY MAGNETIC

Figure 3

What are these dangerous materials that we in the military refer to? Well, for the safety topic this morning, a dangerous material is defined as any material that is flammable, corrosive, an oxidizing agent, explosive, toxic, radioactive, or unduly magnetic. I might point out to those who are thinking of these as hazardous materials: about the only thing that I can leave you with is, it depends on which book you are looking at at the time. If you look in one tariff, they are referred to as restricted articles; if you look in another tariff, they are referred to as hazardous materials; if you look in another document, they are referred to as dangerous materials. We are talking about one and the same.

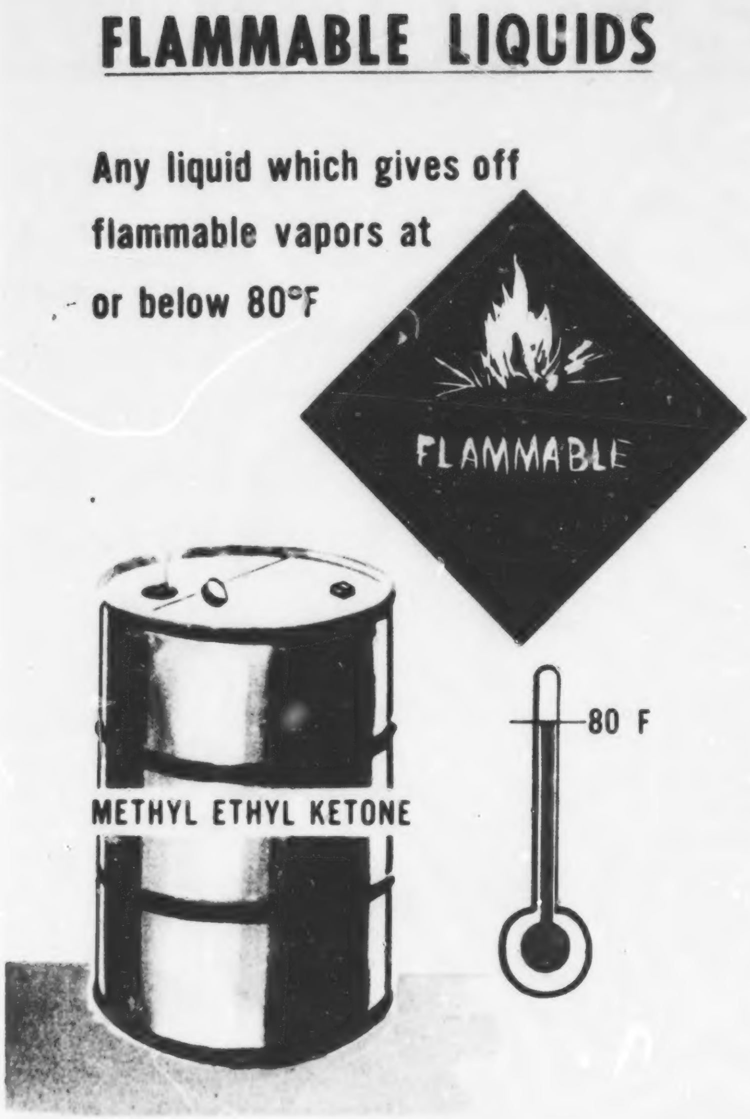
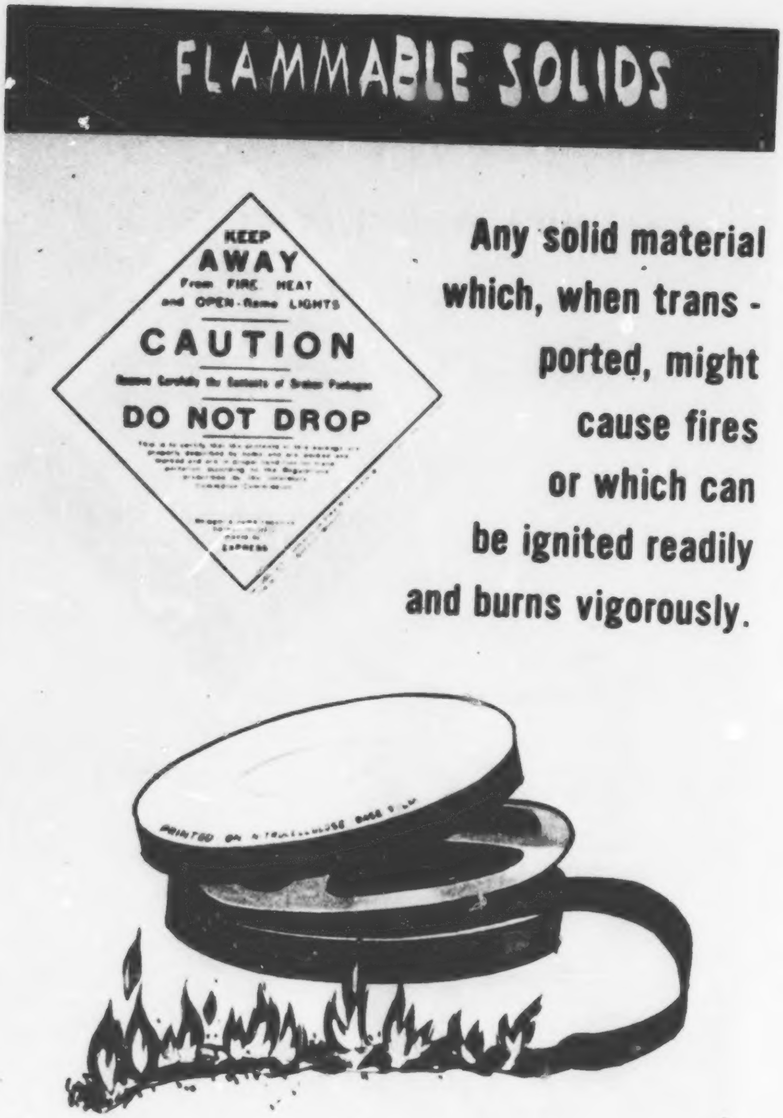

FLAMMABLE LIQUIDS
Any liquid which gives off
flammable vapors at
or below 80°F
FLAMMABLE
METHYL ETHYL KETONE
80 F

Figure 4

Flammable liquids. So far as our flammable liquids go, here is a book definition of a flammable liquid: any liquid which gives off flammable vapors at or below 80° F. We've used a typical example of methyl ethyl ketone, which has a flash point of somewhere around 24° F. It is interesting to note that oils used in pesticides all have a flash point higher than 80° F.



FLAMMABLE SOLIDS

Any solid material which, when transported, might cause fires or which can be ignited readily and burns vigorously.

KEEP
AWAY
From FIRE, HEAT
and OPEN-flame LIGHTS
CAUTION
Remove Carefully the Contents of Broken Packages
DO NOT DROP
EXPRESS
PRINTED ON

Figure 5

Flammable solids. These are defined as any solid material which, when transported, might cause fires or which can be ignited readily and burns readily. Again, that which is depicted on the slide comes right out of the book; that is the best book definition of what a flammable solid is.

COMPRESSED GASES

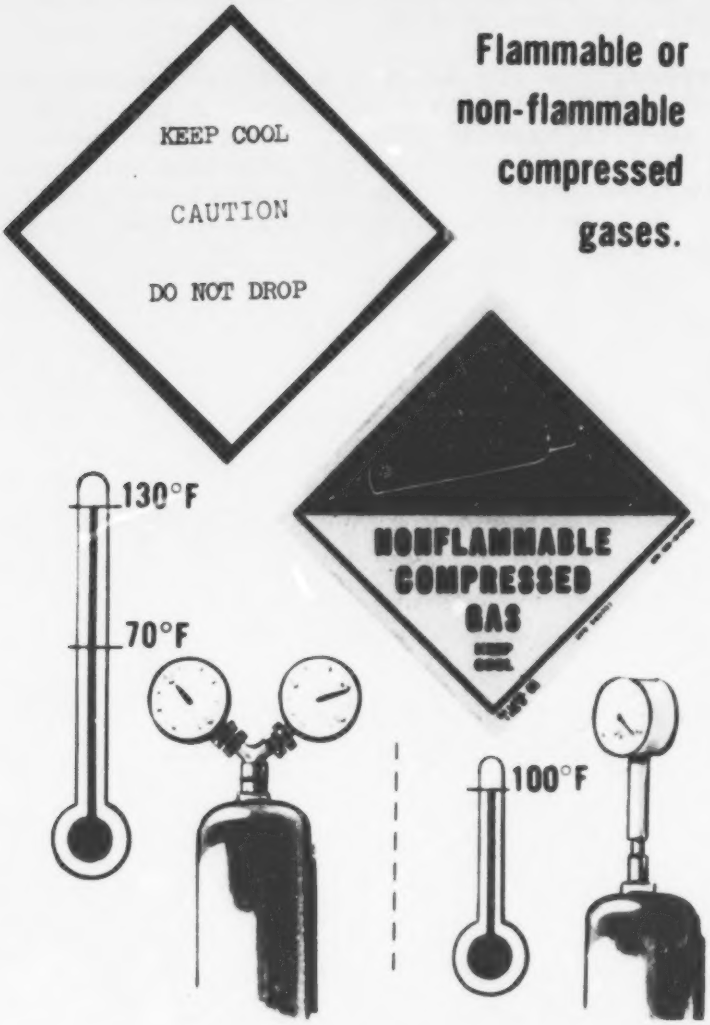

KEEP COOL
CAUTION
DO NOT DROP
Flammable or non-flammable compressed gases.
130°F
70°F
NONFLAMMABLE COMPRESSED GAS
KEEP COOL
100°F

Figure 6

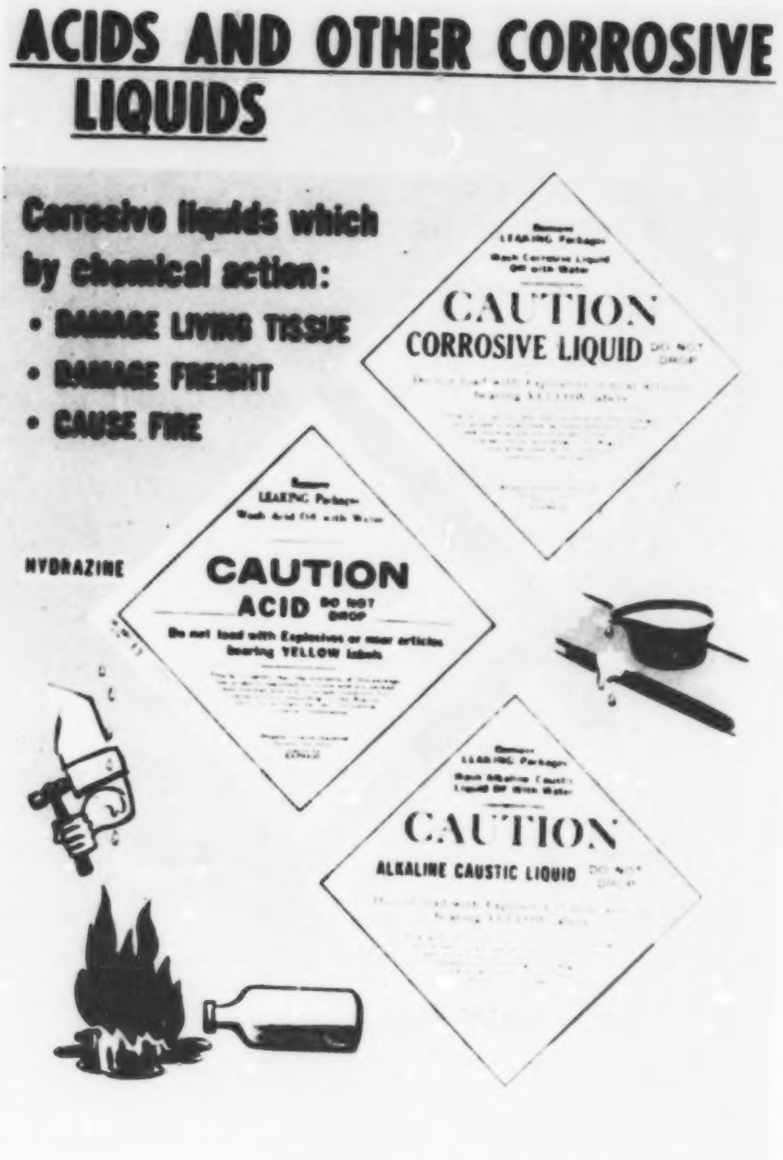
Compressed gases. Flammables also come in gas form. This is a situation that we run into considerably, especially when shipping by military air. It presents quite a problem on our compressed gas cylinders.

AFM 71-4 imposes a requirement that all metal containers used in packaging a liquid or semisolid dangerous material shall be capable of withstanding a minimum internal air gauge pressure of at least 15 psi. Liquid or semisolid dangerous

(continued from Figure 6)

materials in containers which do not meet the 15 psi internal pressure must be repackaged or overpacked in metal containers which meet that requirement.

However, the Air Force Logistics Command recently published information stating that the practice of overpacking aerosol cans in 15 psi metal containers will be discontinued immediately. This practice can create an explosive atmosphere within the container used for overpacking. A fiberboard or wood box overpack is considered to be sufficient.



ACIDS AND OTHER CORROSIVE LIQUIDS

Corrosive liquids which by chemical action:

- DAMAGE LIVING TISSUE
- DAMAGE FREIGHT
- CAUSE FIRE

HYDRAZINE
Beware
LEAKING Packages
Wash Corrosive Liquid Off with Water
CAUTION
CORROSIVE LIQUID
DO NOT DROP
Beware
LEAKING Packages
Wash Acid Off with Water
CAUTION
ACID
DO NOT DROP
Do not load with Explosives or near articles bearing YELLOW labels
Beware
LEAKING Packages
Wash Alkaline Caustic Liquid Off With Water
CAUTION
ALKALINE CAUSTIC LIQUID
DO NOT DROP

Figure 7

Acids and other corrosive liquids. Corrosive liquids, which by chemical action can damage living tissue, damage freight, or cause fire. And again, all the labels shown on this particular slide are for shipment by surface. I feel the majority of you would recognize them as such.

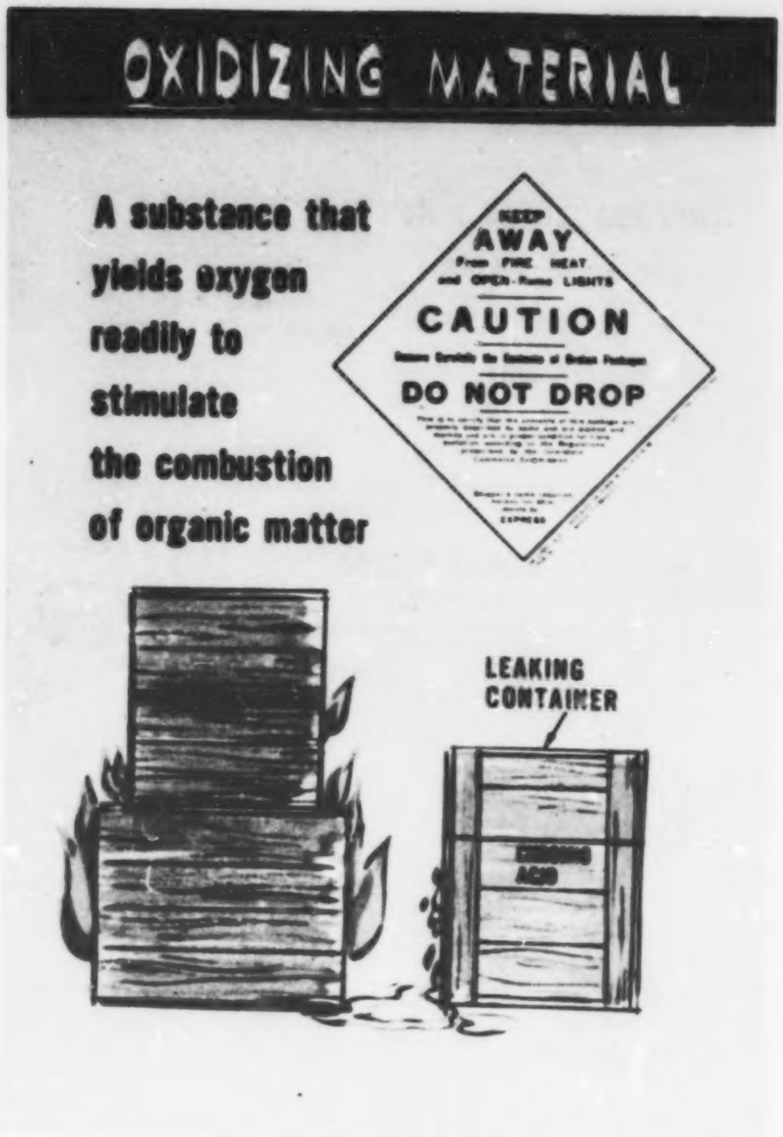
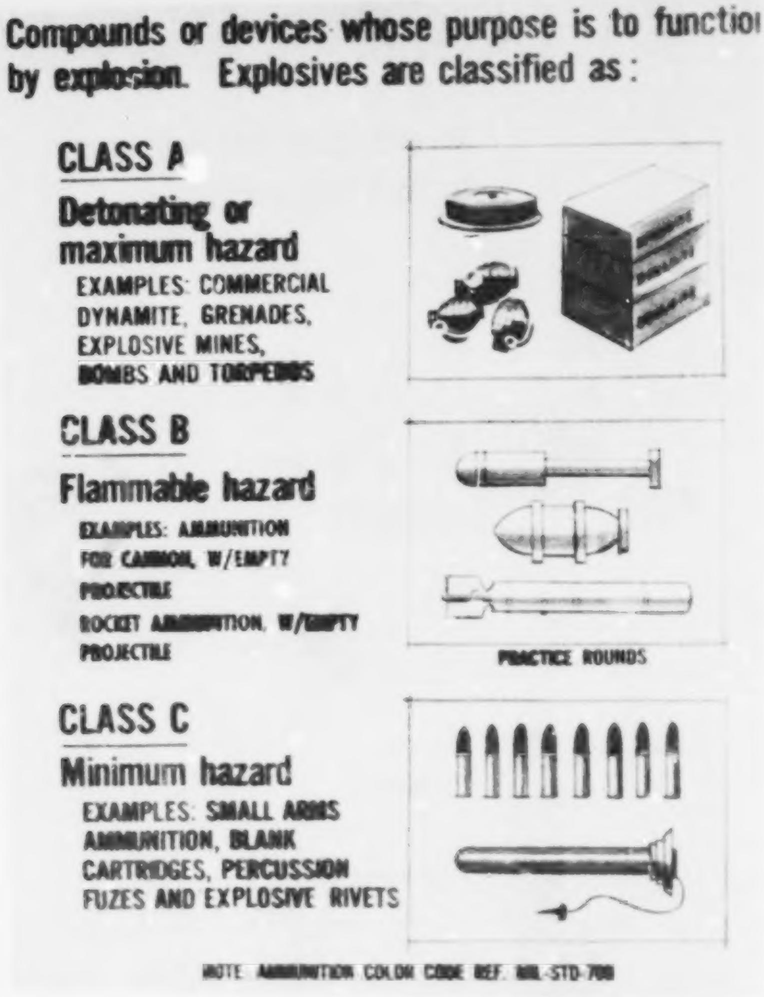

OXIDIZING MATERIAL
A substance that yields oxygen readily to stimulate the combustion of organic matter
KEEP
AWAY
From FIRE HEAT
and OPEN-Flame LIGHTS
CAUTION
DO NOT DROP
EXPRESS
LEAKING CONTAINER
ACID

Figure 8

Oxidizing materials. Again, the book definition of what is an oxidizing material is: a substance that yields oxygen readily to stimulate the combustion of organic matter.



Compounds or devices whose purpose is to functio by explosion. Explosives are classified as:

CLASS A

Detonating or maximum hazard

EXAMPLES: COMMERCIAL DYNAMITE, GRENADES, EXPLOSIVE MINES, BOMBS AND TORPEDOS

CLASS B

Flammable hazard

EXAMPLES: AMMUNITION FOR CANNON, W/EMPTY PROJECTILE

ROCKET AMMUNITION, W/EMPTY PROJECTILE

PRACTICE ROUNDS

CLASS C

Minimum hazard

EXAMPLES: SMALL ARMS AMMUNITION, BLANK CARTRIDGES, PERCUSSION FUZES AND EXPLOSIVE RIVETS

NOTE: AMMUNITION COLOR CODE REF. MIL-STD-709

Figure 9

Explosives. Because of the Southeast Asia situation over the past few years, this category has caused us a great deal of concern, in that we have shipped many tons of explosives to Southeast Asia. Explosives, in so far as we're primarily concerned, fall into these three classes: Class A - detonating or otherwise maximum hazard, Class B - explosive, flammable hazard, or Class C - explosive, minimum hazard. Depending on what the explosive is made out of, naturally it falls into a specific class.

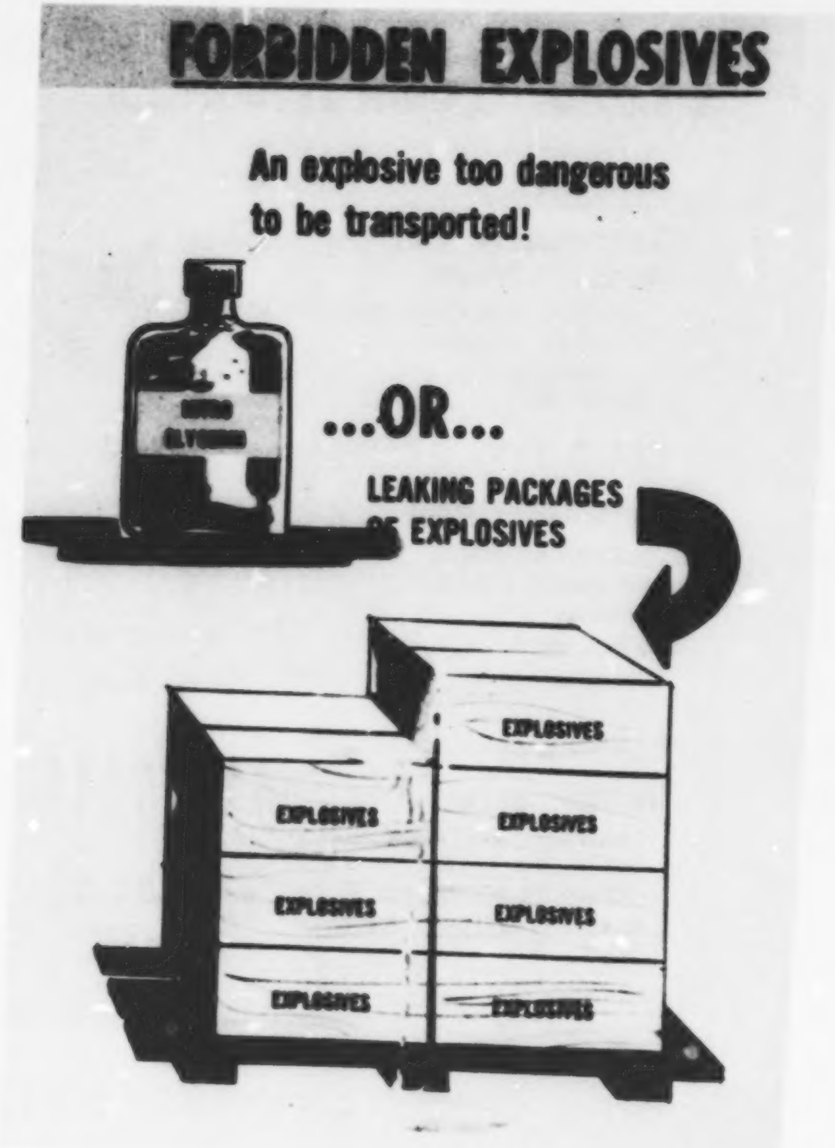

FORBIDDEN EXPLOSIVES
An explosive too dangerous to be transported!
NITRO GLYCERIN
...OR...
LEAKING PACKAGES OF EXPLOSIVES
EXPLOSIVES
EXPLOSIVES
EXPLOSIVES
EXPLOSIVES
EXPLOSIVES
EXPLOSIVES
EXPLOSIVES

Figure 10

Forbidden explosives. There are other classes of explosives that very few people pay much cognizance to. One of these is "forbidden explosives." We include something here like nitroglycerin or leaking packages of explosives. It is illegal to offer for shipment or to accept for shipment any type of explosive in this category.

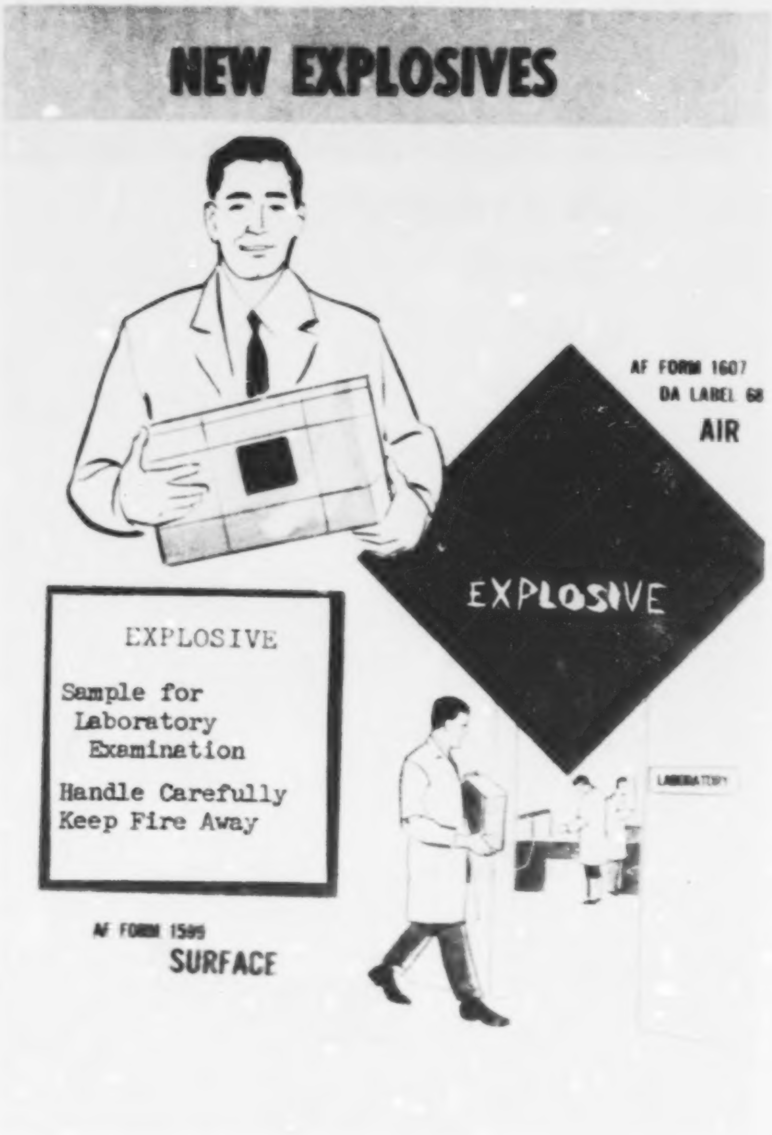
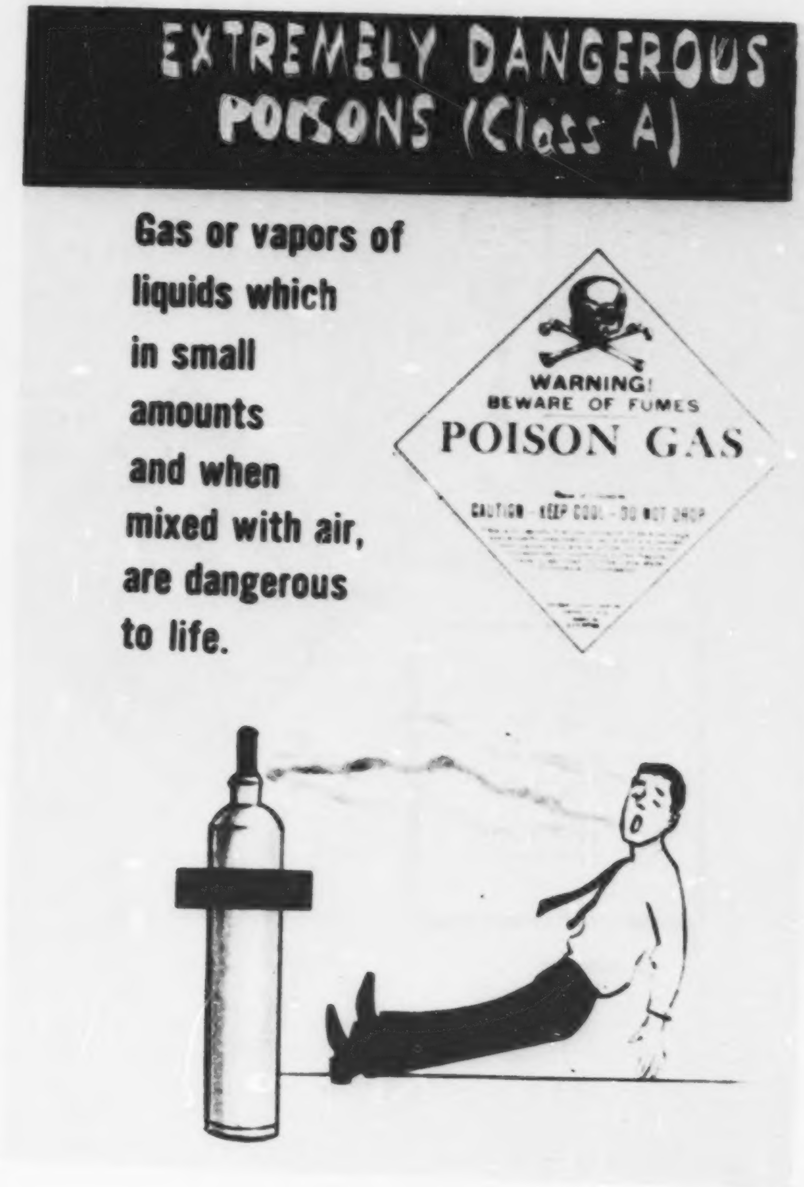

NEW EXPLOSIVES
AF FORM 1607
DA LABEL 68
AIR
EXPLOSIVE
EXPLOSIVE
Sample for Laboratory Examination
Handle Carefully
Keep Fire Away
LABORATORY
AF FORM 1595
SURFACE

Figure 11

New explosives. There is another explosive that we run into quite a bit that gives us a little problem now and then. It's a "new explosive", more adequately described as a laboratory sample explosive. We are only permitted to ship so many pounds, 10 if you will, of experimental explosives. I'm not sure exactly how big an explosion a whole 10 lbs. of an experimental explosive would make, because that amount may never have been exploded before.



EXTREMELY DANGEROUS POISONS (Class A)

Gas or vapors of liquids which in small amounts and when mixed with air, are dangerous to life.

WARNING!
BEWARE OF FUMES
POISON GAS
CAUTION - KEEP COOL - DO NOT DROP

Figure 12

Poisons. Now we get into our poisons. In recent years we now deal with only 3 classes of poisons. Extremely dangerous poisons, Class A, are poisonous gases or liquids of such nature that a very small amount of the gas or vapor of the liquid, when mixed with air, is dangerous to life. We show something here like a phosgene gas as a typical representative of Class A poisons.

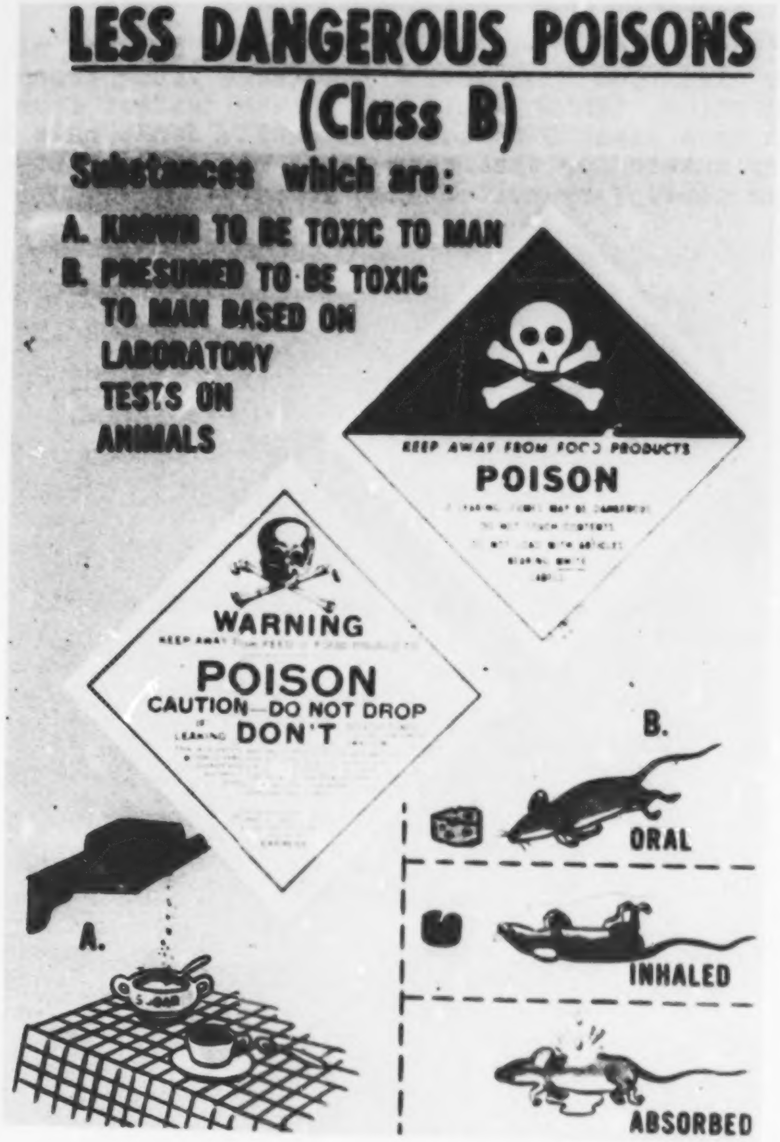

LESS DANGEROUS POISONS
(Class B)
Substances which are:
A. KNOWN TO BE TOXIC TO MAN
B. PRESUMED TO BE TOXIC TO MAN BASED ON LABORATORY TESTS ON ANIMALS
KEEP AWAY FROM FOOD PRODUCTS
POISON
WARNING
POISON
CAUTION—DO NOT DROP
DON'T
A.
B.
ORAL
INHALED
ABSORBED

Figure 13

Less dangerous poisons, Class B, include substances, liquid or solid, which are known to be so toxic to man as to constitute a hazard to health during transportation, or which, in the absence of adequate data on human toxicity, are presumed to be toxic to man because they fall within certain categories when tested on laboratory animals. Most pesticides fall into this category.

I'm sure that many of the learned gentlemen previous to me here have given us the definition of various classes

(continued from Figure 13)

of poisons. You would be surprised, maybe, how many times in the classroom some individual (some young trooper) asks the question, "Which would you be the deadest from, a Class A poison or a Class B poison?" I really don't have a satisfactory answer for that because we recognize that either one of them could very well finish you off.

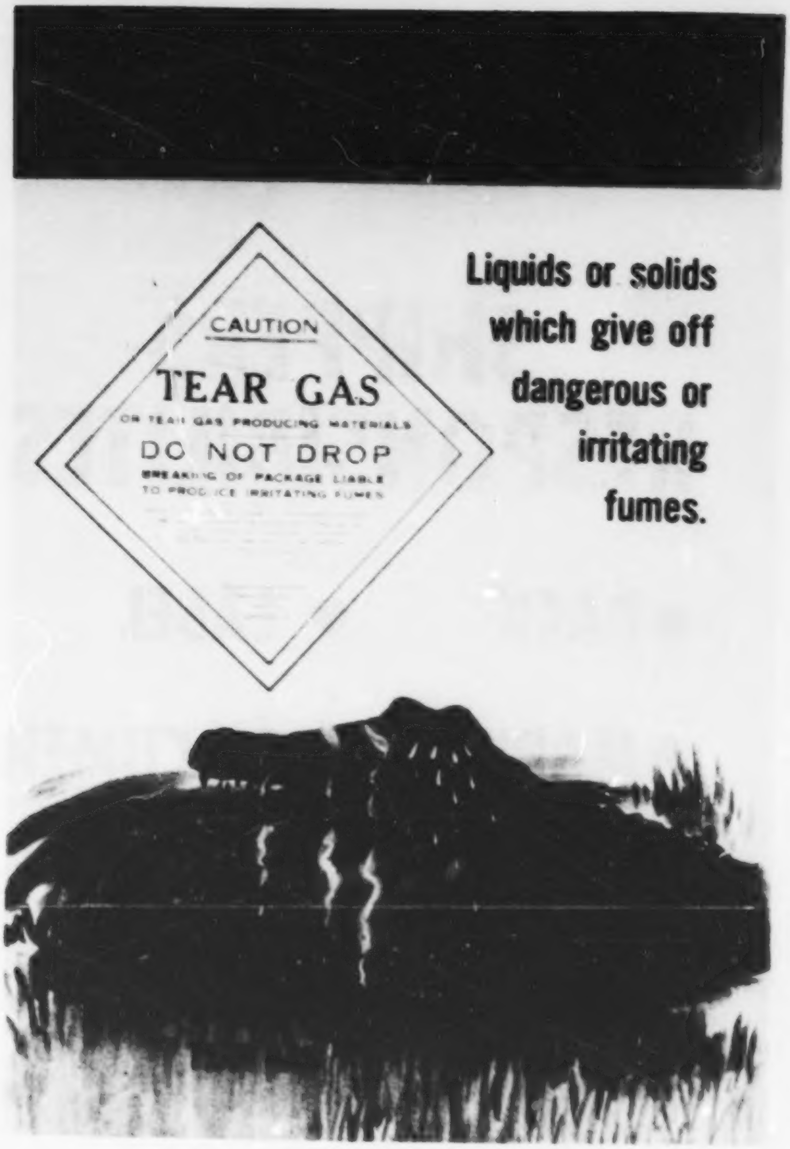

CAUTION
TEAR GAS
OR TEAR GAS PRODUCING MATERIALS
DO NOT DROP
BREAKING OF PACKAGE LIABLE TO PRODUCE IRRITATING FUMES
Liquids or solids which give off dangerous or irritating fumes.

Figure 14

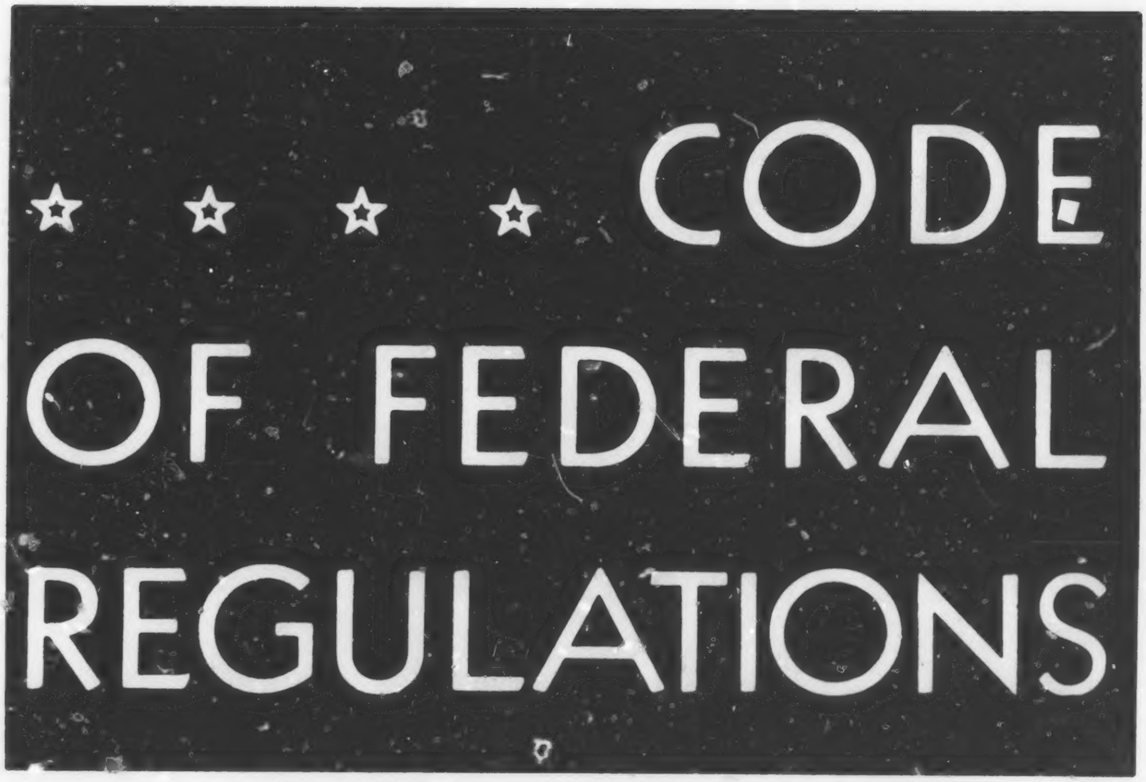
Class C poisons are represented by tear gas and other irritating substances, mace for riot control, and the material that the postman carries for dogs, and that sort of thing. They are liquid or solid substances which, upon contact with fire, or when exposed to air, give off dangerous or intensely irritating fumes.

SHIPPERS RESPONSIBILITES

- PACK
- LABEL
- MARK
- DOCUMENT
- CERTIFY

Figure 15

We have talked about shipper's responsibilities and again I would say that they have been fully covered. I believe, however, these are what we, the military, feel are our shipper's responsibilities: the packaging, packing, labeling, marking, documenting, and certifying the shipment of these materials. It certainly falls upon the shipper, and any one of these are his responsibility.



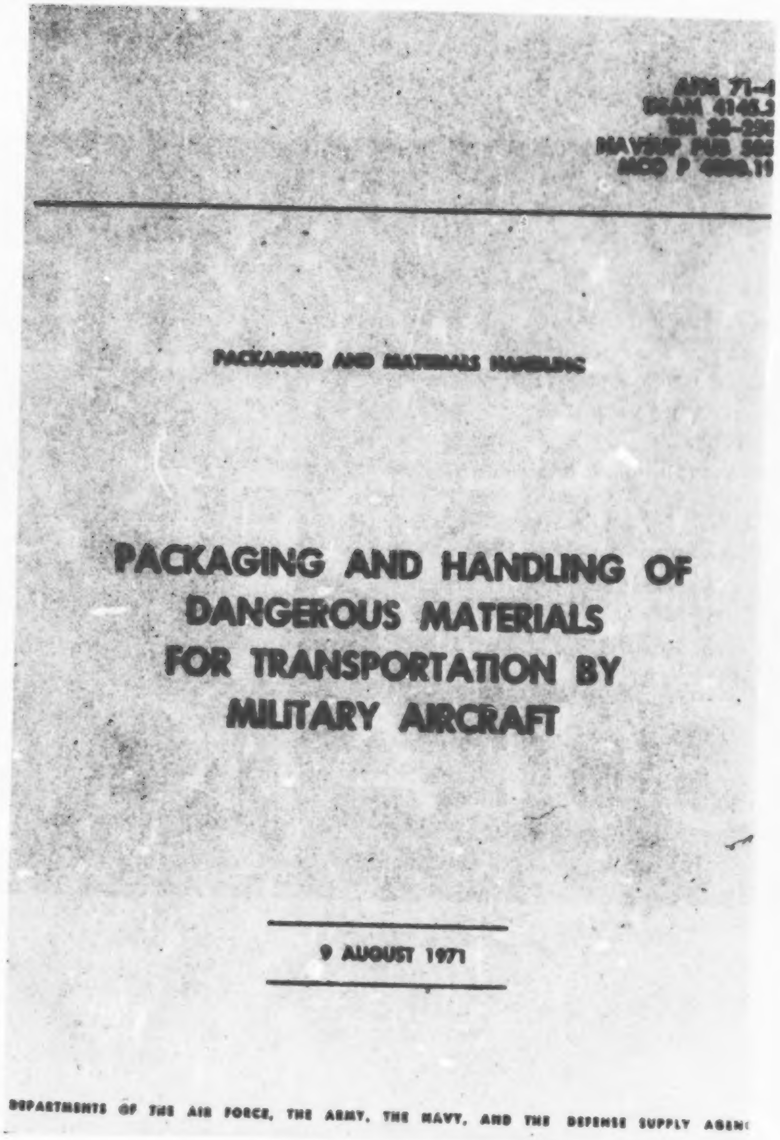
☆ ☆ ☆ ☆ CODE

OF FEDERAL

REGULATIONS

Figure 16

Now, as it was already pointed out by several before me, we in the military are also definitely governed by the Code of the Federal Regulations. As a matter of fact, I had in this series of slides all of the various Codes of Federal Regulations that we are governed by. I was going to show them to you; however, they have been well pointed out by Mr. Burns. Primarily what we're concerned with is the 49th Code of Federal Regulations. I shall explain in just a minute the reasoning for it.



AFM 71-4
DSAM 4145.3
TM 38-25
NAVSUP PUB 50
MCO P 4030.1

PACKAGING AND MATERIALS HANDLING

PACKAGING AND HANDLING OF
DANGEROUS MATERIALS
FOR TRANSPORTATION BY
MILITARY AIRCRAFT

9 AUGUST 1971

DEPARTMENTS OF THE AIR FORCE, THE ARMY, THE NAVY, AND THE DEFENSE SUPPLY AGEN

Figure 17

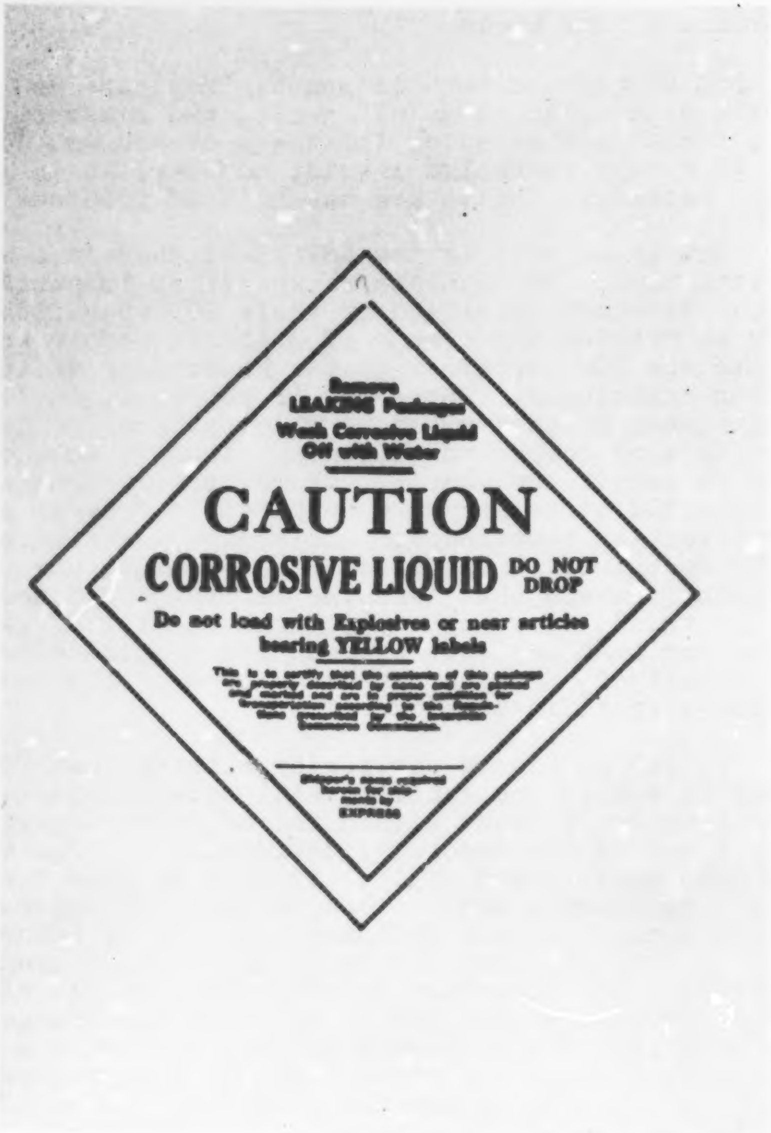
In addition to the Code of Federal Regulations, we within the military, and specifically when shipping by military aircraft, are governed by a fully coordinated document we call the Air Force Manual 71-4. It has been coordinated by the Defense Supply Agency, the Army, the Navy, the Marine Corps, and the Air Force. Actually, the Air Force writes this document. This document only has application when preparing our dangerous materials for shipment by military aircraft. Someone might say, since we're talking about an

(continued from Figure 17)

example of poisons in this group, "How come you pick fuming nitric acid as an example?" Well, two reasons. First of all, fuming nitric acid, for those of you who don't know it, is a very corrosive liquid; however, it is also a very toxic material. We've had our fill of problems with it.

Now going back to the AMF 71-4, there's a shortcoming in that book. The containers specified in our Air Force Manual 71-4 are specified by their DOT specification number. It's surprising the number of military people who cannot relate the DOT container to the Federal or military specification containers. There is, if you will, in 71-4, an "Attachment 2" that gives us a comparison. I hesitate to use the word comparison, although I don't know of a better word to use at the moment. There is a listing whereby certain DOT containers are compared to federal and military specification containers. And again 71-4 states that where a DOT container is specified, then we must use the DOT container except that (and the Air Force allowed themselves out on this), if we have a federal or military specification container that meets or exceeds the requirements of the DOT container, then we can use either of the federal or military specification containers.

It was mentioned earlier by someone that DOT is getting ready to revise the labeling situation. I certainly hope that they do, because within the military department we have a system for reporting deficiencies. For those of you who have never heard of it, it's the DD Form 6 system. It's nothing more than a form, a sheet of paper by which we can report certain deficiencies. It is interesting to note over the past few years that I have been teaching statistics on this, that in all cases, in all military departments more than 50% of all deficiencies generated in the handling of dangerous materials deal in some way with marking. Fifty-eight percent of all Army DD Form 6-s are generated because of something incident to marking. In all cases they are all attributable to something in marking.



Remove
LEAKING Packages
Wash Corrosive Liquid
Off with Water

CAUTION

CORROSIVE LIQUID DO NOT DROP

Do not load with Explosives or near articles
bearing YELLOW labels

Figure 18

If we were shipping this corrosive material by surface, we would use the corrosive liquid (surface) label.

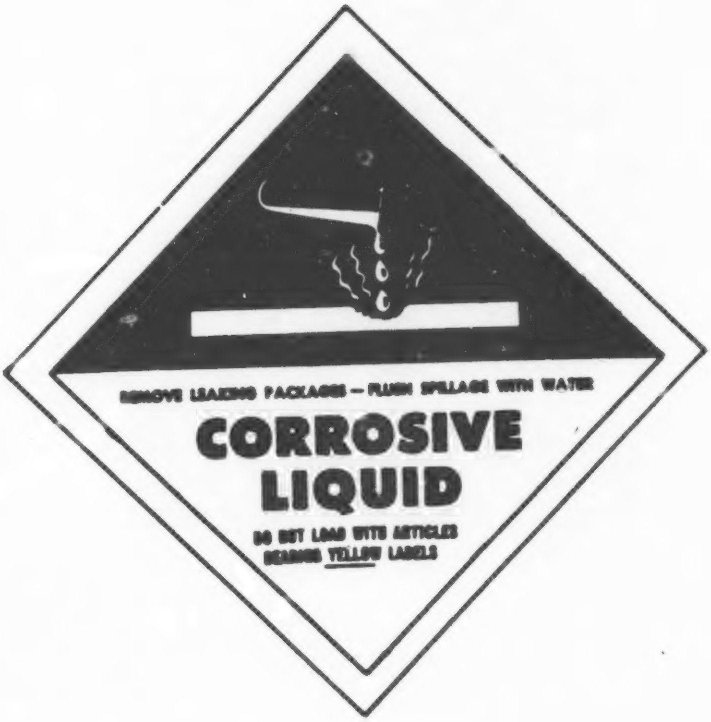

REMOVE LEAKING PACKAGES — FLUSH SPILLAGE WITH WATER
CORROSIVE LIQUID
DO NOT LOAD WITH ARTICLES BEARING YELLOW LABELS

Figure 19

If we were shipping by air, we would use the corrosive liquid (air) label. There is a new corrosive label out, and for those of you who have not seen it yet, I have a few of them that have not been made into slides. This new corrosive label will become mandatory, I believe, on the 31st of December of this year (1972); it is in the supplement to Mr. Graziano's "Tariff 25".

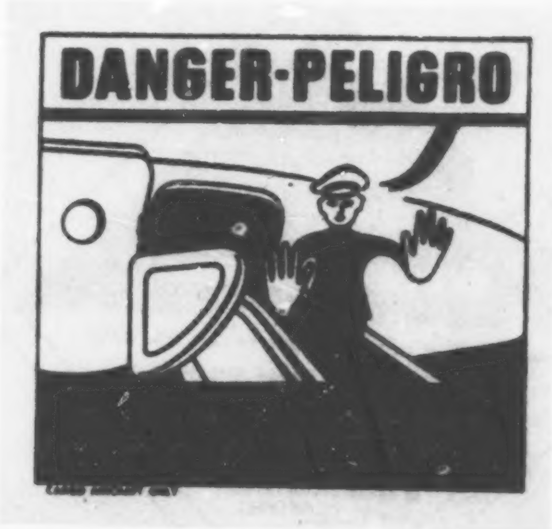
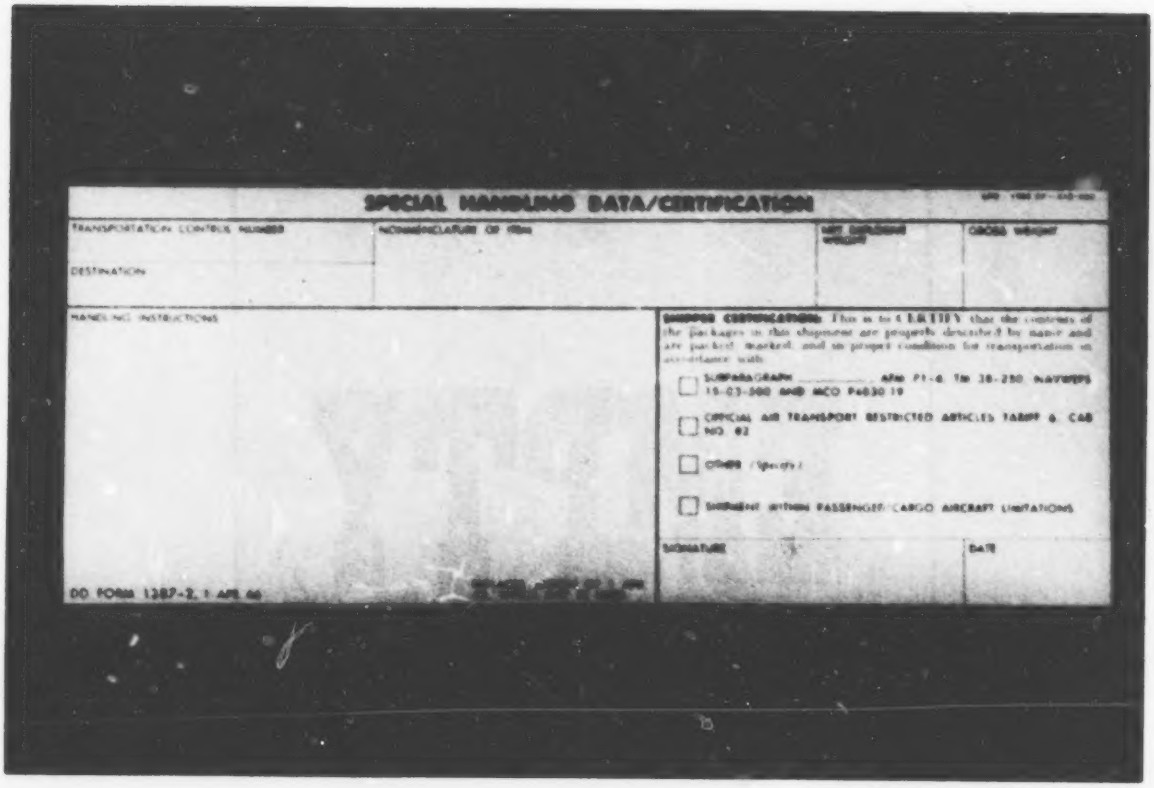


Figure 20

In addition, if we're shipping this material by a commercial aircraft, it will require another label we refer to as a peligro label. This is to indicate that we cannot ship this material on a passenger-carrying aircraft.



SPECIAL HANDLING DATA/CERTIFICATION

TRANSPORTATION CONTROL NUMBER

DESTINATION

NOMENCLATURE OF ITEM

NET EXPLOSIVE WEIGHT

GROSS WEIGHT

HANDLING INSTRUCTIONS

SHIPPER CERTIFICATION: This is to CERTIFY that the contents of the packages in this shipment are properly described by name and are packed, marked, and in proper condition for transportation in accordance with:

☐ SUBPARAGRAPH ________ AFM 71-4, TM 38-250, NAVWEPS 15-03-500 AND MCO P4030.19

☐ OFFICIAL AIR TRANSPORT RESTRICTED ARTICLES TARIFF 6, CAB NO. 82

☐ OTHER (Specify)

☐ SHIPMENT WITHIN PASSENGER/CARGO AIRCRAFT LIMITATIONS

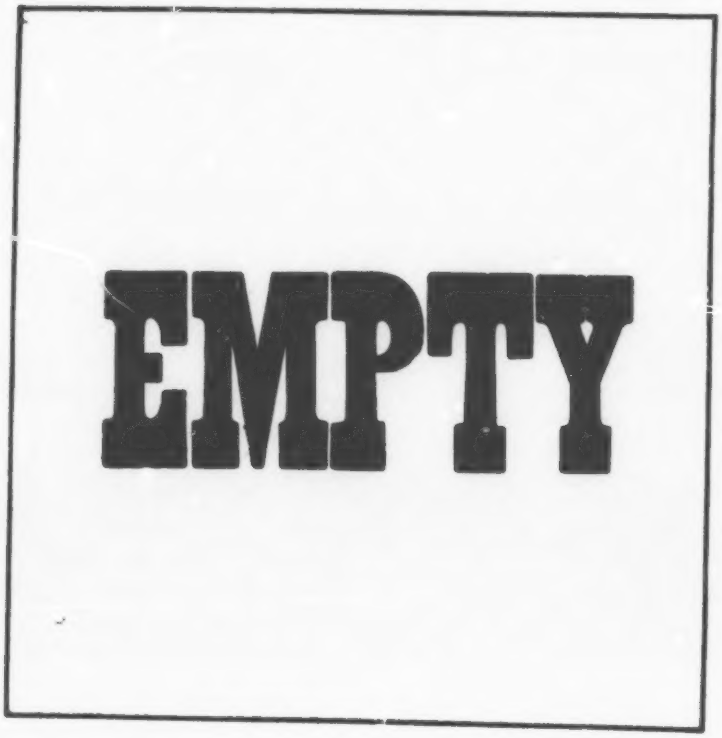
SIGNATURE

DATE

DD FORM 1387-2, 1 APR 66

Figure 21

If we are shipping a material like nitric acid by military aircraft, we have still another form that must be made out, the DD Form 1387-2. This particular form is responsible for some 80% of all dangerous materials shipped to Southeast Asia in the years '67, '68, '69, along there. This one particular form was also responsible for the frustration of approximately 80% of our dangerous cargo going to Southeast Asia. Again, the form was improperly filled out, or somebody failed to sign it; any number of problems entered into the form, which is why the material got frustrated. By frustrated we mean that it cannot be moved further; it had to be taken out of the transportation cycle and set down at the airport of embarkation until the corrections could be made on it.



EMPTY

Figure 22

These are but a few of the forms and labels that we use. After we have emptied the containers, there's a requirement that we use an "Empty Label" on each container to show that it is indeed empty. There will probably still be some residual material left in there, even though we consider it to be empty. We in the military, in the majority of cases, handle the shipment of our so-called "empty" containers in the same manner that we do if they were full.

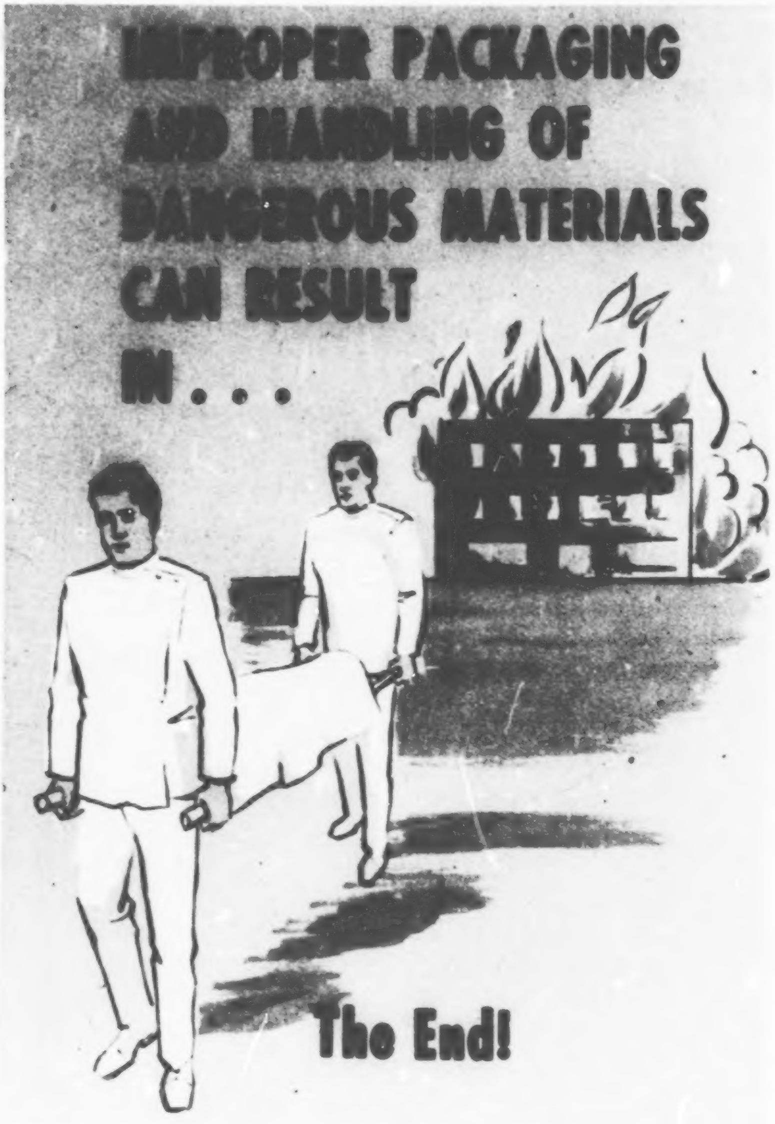

IMPROPER PACKAGING
AND HANDLING OF
DANGEROUS MATERIALS
CAN RESULT
IN . . .
The End!

Figure 23

Last, but not least, certainly we within the military department recognize the importance of following prescribed procedures with respect to these dangerous materials, because otherwise improper packaging and handling could very well result in "THE END".

William Jones has been with the Joint Military Packaging Training Center of the Department of Defense for nine years. Prior to this, he spent 20 years in the Army and worked in the field of logistics for many of these years.

REGISTRATION AND REGULATION OF PESTICIDES WITH REFERENCE TO CONTAINERS

by

Harold G. Alford
Special Assistant to Deputy Assistant
Administrator for Categorical Programs
Environmental Protection Agency
Washington, D. C.

The regulation of pesticides in the United States was concerned primarily with effectiveness of insecticides and fungicides prior to 1947. That year the Insecticide Act of 1910 was replaced by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) which encompassed safety regulations along with effectiveness. Like most regulatory laws, the principal emphases under the FIFRA have changed with the changing times and technology. While avoiding neglect of any provisions of the Act, we have placed the greatest effort in the areas of greatest public concern. Most of you will recall that concern over pesticide residues in food demanded considerable attention in the early 1960's. You will also recall that certain far reaching changes in policy in the administration of the law resulted from this concern. Today the public is relatively free from worrying about residues in food, or at least their worry is not being expressed as it was a few years ago. In a field as diverse and dramatic as pesticide regulation has been, we have found that the resolution of a major problem is rewarded by other major problems requiring a resolution.

Therefore, in the late 60's we moved into an age of environmental concern. This brought about increased concern over the problems caused by empty pesticide containers, and the problems caused by leaking containers, or faulty containers. Our positions, both administratively and legally, did change somewhat with this change in public concern. We did place more emphasis on proper containers and disposal. We have required that certain statements warning against the misuse of containers or the reuse of empty containers for other purposes be included as a condition for registration. These were usually rather simple straight-forward statements such as, "Do not reuse container, destroy when empty."

We are still requiring warnings on labels regarding the disposal of containers. This is of limited effectiveness from the standpoint of avoiding accidents or avoiding problems involving empty pesticide containers. However, it is useful and warranted.

Another area where we have made some real progress, is that of attractive nuisances. If a pesticide container or a pesticide is packaged in such a manner that it is likely to increase the attractiveness of the product to children, increasing the likelihood of ingestion or accidents, we have taken some rather definite action and have been rather successful. For example, prior to the middle 60's, poisonous bait products in bottle caps were registered. No one can question the fact that bottle caps have been collectors' items for many years. For a while athletes' pictures were placed in bottle caps and children collected them. Some of you may remember when you took the cork out of the bottle cap, you put the cap on the outside of the bib of your overalls, you pressed the cork from the inside, and you had a badge.

There has long been concern over the likelihood of glass breakage or the lack of stability of certain containers for highly toxic materials, and, of course, the devastating results that could happen in case of accident where such products are being shipped. There have been cases in other countries of this type. We have not taken regulatory action with respect to limiting this type of product to containers other than glass or to any particular type of material.

We have cooperated with certain industrial firms in the development of certain types of plastic which we hope will hold many of these chemicals without the solvent being lost through the plastic.

The previous speaker discussed the Poison Prevention Packaging Act of 1970. I would add that this Act did amend the Federal Insecticide, Fungicide and Rodenticide Act as far as enforcement is concerned. The Food and Drug Administration of HEW is charged with responsibility for establishing standards, as you have been told. We are charged with enforcing these standards as far as pesticide products are concerned. And I believe it was pointed out that the closures required under that law deal with products in toxicity categories 1 and 2.

At present, we have a new law that's getting much attention: the Federal Environmental Pesticide Control Act of 1972. This brings about some changes in concept, and some completely new provisions that we have little experience in, such as the actual regulation of pesticide use. This new law makes it unlawful for any person to use a registered pesticide inconsistent with the labeling. Enforcement actions under this provision will, of course, involve a consideration of the significance of misuse, and many interpretations of significance will be necessary. Whether or not failure to follow label directions is disposing of empty containers would be unlawful under this new provision is an interesting question. I do not know the answer. This has been discussed with our legal people and it has been concluded that such questions will have to be dealt with in regulations.

Another provision of the new law deals with disposal of pesticide containers. I believe the next speaker will go into this in some detail. I will only read one quote from the law regarding the authority placed on EPA with respect to disposal of containers. Section 19 reads in part "The Administrator shall after consultation with other interested Federal agencies establish procedures and regulations for the disposal or storage of packages and containers of pesticides and for disposal or storage of excess amounts of pesticides, and accept at convenient locations for safe disposal a pesticide the registration of which is canceled under Section 6(c) if requested by the owner of the pesticide." This is a completely new responsibility for EPA and will undoubtedly surface some new problems. When you consider the size of this country and some of the distances involved, the collection of empty containers or excess pesticides on a nationwide scale staggers the imagination. A cooperative program with State officials as well as cooperation from the pesticide industry and growers will be necessary to make this work.

I believe this shows that the concern for pesticide containers in the regulation of pesticides will definitely increase in the months and years ahead, and hopefully we can initiate practical and useful programs that will benefit the public with a minimum of expense.

Question: In your opinion, could we anticipate that EPA will require LD_{50} levels as a registration requirement.

Answer: Yes, one of the basic requirements for any new formulation or for a new chemical is the basic acute studies including LD_{50} values for the formulated product. If there are related formulations or similar formulations where we already have that information, certainly judgments can be made, and I see no change in this. If you have a 75% wettable powder registered and you make a 25% wettable powder by adding more inert diluent, toxicity data on the 25% product would not be required.

Harold G. Alford has recently been appointed Special Assistant to the Deputy Administrator for Pesticide Programs in the U. S. Environmental Protection Agency. He is better known for his many roles in the Pesticides Regulation Division where he has worked since 1960, and was its Director for the past 18 months. He graduated from the University of Alabama at Auburn, with a degree in education, and did graduate work in entomology prior to entering USDA to undertake research on pesticides affecting man and animals.

PESTICIDE CONTAINERS AND DISPOSAL SYSTEMS

by

William E. Roper
U.S. Environmental Protection Agency
Office of Solid Waste Management Programs
Washington, D. C.

Introduction:

The use and disposal of pesticides within the United States has received an increasing amount of attention both from the general public, industry, government and the scientific community. Incidents involving large numbers of fish kills, run-off water contamination, and occasional human deaths due to improper pesticide management, have given the problem increased visibility. Proper disposal of pesticides from an environmental standpoint must consider both the pesticide itself and the container in which the pesticide is held. Present regulations require that labeling stipulate specific practices to be followed in using all registered pesticides. However, the manner in which the spent pesticide container is disposed of may not always be included or specified satisfactorily on the labels.

Problem Definition:

One aspect of the pesticide container problem is the wide dispersion of the containers themselves throughout the country. The major use of pesticides which result in container discard is the agricultural industry, if the small aerosol container problem is isolated as a separate issue. Farm uses of pesticides are fairly evenly distributed throughout the United States, with peaks in the Southwest, the corn belt of the Great Plains, and in the Pacific states, primarily in California. Associated with agricultural usage are also the seasonal peaks of pesticide application periods and therefore periods of maximum container discard.

One of the critical problems with empty pesticide containers is that they are not completely empty and small quantities of active material usually remain. The design of metal containers, including 5 gallon pails, and 30 to 50 gallon drums, do not facilitate complete draining. A number of campaigns have been mounted to institute rinse and drain procedures but so far they have been only partially successful in solving this problem, the net result being that the majority of containers still are not handled properly.

It has been estimated that over 240 million pesticide containers were used in 1968, and only a small fraction of that quantity were reused. This represents a significant nationwide disposal problem for empty or spent pesticide containers. Commonly farmers and commercial applicators discard spent containers in the nearest available area unless there is an incentive to return them to the supplier or a salvage and reconditioning operation. Consequently, in areas of heavy pesticide use, caches of pesticide containers are often found along roadways, edges of forests, wasteland, air strips, and other areas where pesticide materials are used. Many users discard pesticide containers in open dumps and ordinary landfills where they are readily available. Readily combustible pesticide containers, such as paper or plastic bags and fiber drums, are commonly open burned. In some cases fiber drums and plastic bags are even used for storage and handling of other materials.

The hazards of improper pesticide container disposal are paralleled by the hazard of the pesticide itself. Examples of hazardous conditions resulting from improper pesticide and pesticide container disposal practices are many. One case which the EPA Task Force on Excess Chemicals has become involved in related to an arsenic compound improperly disposed of in Northern Minnesota which ultimately threatened to contaminate a town's drinking water supply. Other cases where runoff water has passed through dumping grounds of spent pesticide containers and triggered killing of aquatic life in receiving streams have occurred.

Container Disposal System:

The conceptual development of a container disposal system requires identification of several basic assumptions. These are:

1. Container pickup from scattered sites in rural areas poses a more serious collection problem than does collection from custom applicators and others in urban areas.

2. Federal and state regulations will allow for the transportation of unrinsed containers if in an enclosed vehicle or bulk container.

3. Incineration is the current method of choice for disposing of the organic pesticides.

4. Approved landfills are recommended for the disposal of inorganic and metal containing organics, and as an alternative when incineration of organics is not feasible.

5. Soil disposal methods involving microbial degradation have not been proven practical (as noted by work at Oregon State University and Mississippi State University).

With this background a container disposal system could be broken into 7 major components which includes:

a) collection
b) storage
c) handling
d) transportation
e) treatment
f) reutilization
g) disposal

From a functional standpoint these can be grouped into three major areas (see figure 1).

Collection: Container collection can be either by self collection (where the consumer brings his containers to the collection center), or by government subsidized collection (where the state and/or local government contracts with a private collector). If self collection is used then some form of incentive may be needed, such as a program to publicize the hazards of indiscriminate spent containers and excess pesticide disposal, or a monetary reward program such as a container deposit scheme.

Storage, handling and transportation: Once at the collection center the mode of shipping to disposal will determine whether or not rinsing is employed. If the containers are to be shipped without rinsing, then they must be shipped in either an enclosed truck or in enclosed bulk cnntainers. If the containers are to be shipped in an open vehicle then they must be rinsed by either stationary or mobile equipment. An obvious disposal option is to ship the containers from the collection center directly to an existing regional or, if available, local disposal facility. Alternately, a disposal site could be in the area of the collection center.

Treatment, Reutilization, and Disposal: The site may have a lab for pesticide identification or lab services could be contracted. Disposal by burial and encapsulation alone is a feasible option. However, it is not economically feasible to decontaminate small steel containers for reuse since no market exists. Therefore, incineration would be required for small containers if burial is to be kept to a minimum. Moreover, the economics of decontaminating large containers for reuse is questionable since there may be very few containers collected in suitable reuse condition at a given site. Thus, even though steel container reuse may be desirable it may be economically unfeasible at many sites.

Summary:

It appears that shredding steel organic pesticide containers prior to incineration, combined with encapsulation and burial of those which held inorganic and metal organic pesticides is the best option if an existing disposal facility is not available. A sample system for container disposal incorporating all the components discussed previously is shown in figure 1. The technical options available at each level of a sample collection system are detailed in figure 2. The selection of options within the system is variable based on local conditions, such as the availability of adequate sanitary landfill disposal sites for pesticide materials. However, the general systems concept presented is applicable to most pesticide container collection and disposal situations, and might be used as a guide in developing county or regional pesticide container collection and disposal systems.

William Roper is presently Chief of the Industrial and Agricultural Waste Section, Office of Solid Waste Management, Environmental Protection Agency. He was formerly with the Environmental Control Office, Army Materiel Command Headquarters. He is a past faculty member at North Carolina State University and he received his Ph.D. at Michigan State University, specializing in Environmental Engineering. His Masters and Bachelor work was done at the University of Wisconsin, Madison.

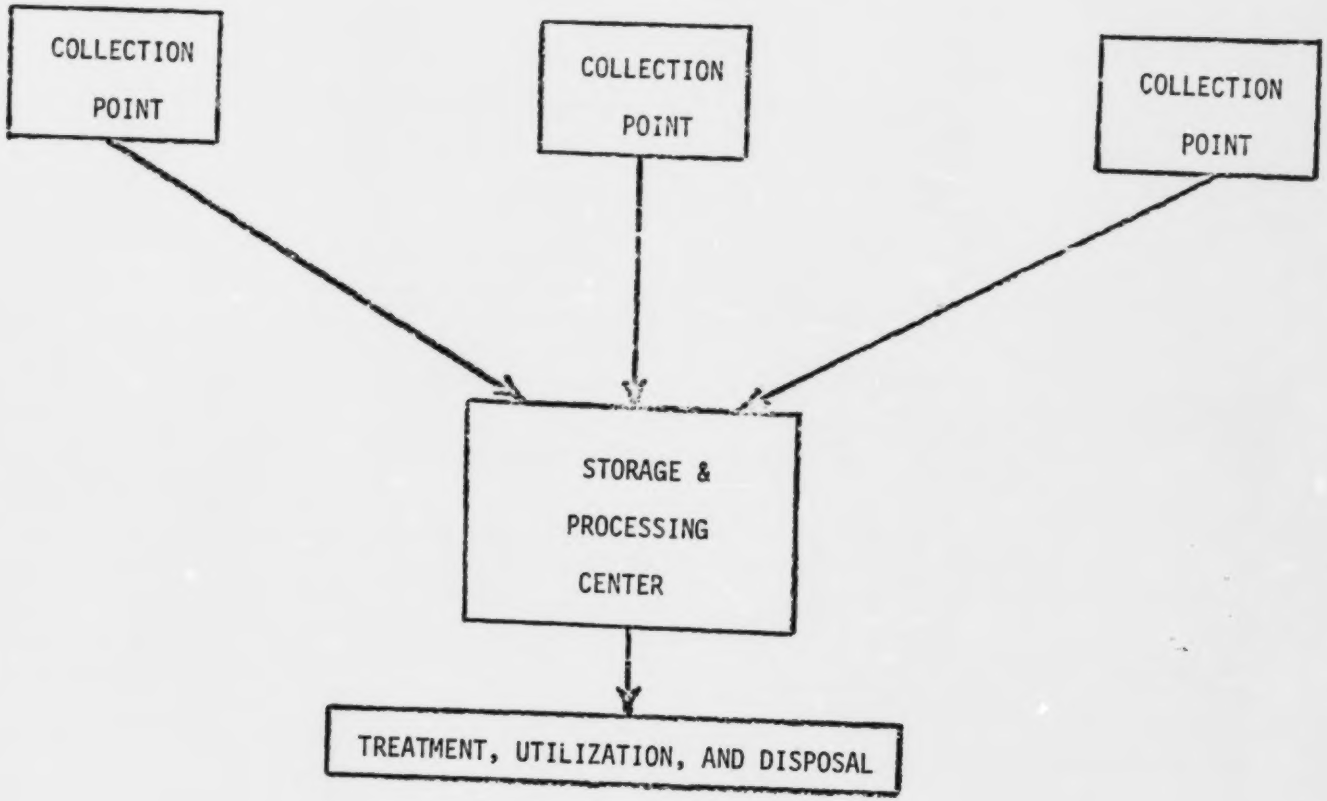
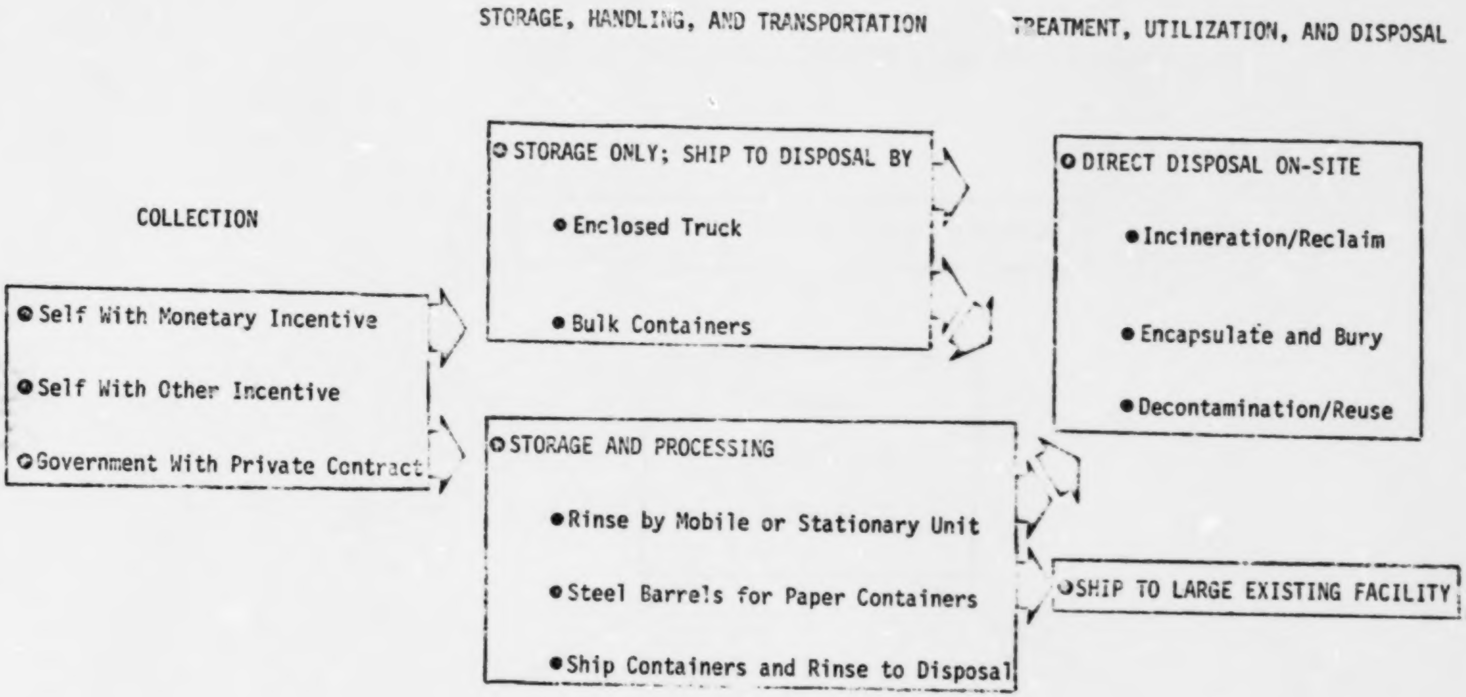

COLLECTION POINT
COLLECTION POINT
COLLECTION POINT
STORAGE & PROCESSING CENTER
TREATMENT, UTILIZATION, AND DISPOSAL

FIGURE 1: PESTICIDE CONTAINER DISPOSAL SYSTEM



STORAGE, HANDLING, AND TRANSPORTATION
TREATMENT, UTILIZATION, AND DISPOSAL
COLLECTION
Self With Monetary Incentive
Self With Other Incentive
Government With Private Contract
STORAGE ONLY; SHIP TO DISPOSAL BY
Enclosed Truck
Bulk Containers
STORAGE AND PROCESSING
Rinse by Mobile or Stationary Unit
Steel Barrels for Paper Containers
Ship Containers and Rinse to Disposal
DIRECT DISPOSAL ON-SITE
Incineration/Reclaim
Encapsulate and Bury
Decontamination/Reuse
SHIP TO LARGE EXISTING FACILITY

FIGURE 2: PESTICIDE CONTAINER DISPOSAL SYSTEM TECHNICAL OPTIONS

THE ENVIRONMENTAL PROTECTION AGENCY LOOKS AT ACCIDENTS AND INCIDENTS RELATED TO CONTAINERS AND HANDLING

by

Charles T. Mitchell
Program Management Officer
Accident Investigation Branch, EPA

Despite our efforts to improve pesticide containers as well as improve the labeling of pesticide products, many accidents are being reported to us as a result of improper storage, disposal, package failure, leakage during transportation, and redistribution of pesticides in other containers, e.g., giving samples out in coke bottles. Let me cite a few examples:

A man was admitted to a hospital in New York about a year ago. He had started to pry open a metal container of chlorinated lime with his pocket knife when the lid blew off. Approximately half of the can's contents were sprayed into his face injuring both eyes. Fortunately, he immediately washed his eyes with water and received medical attention.

A 15-month-old baby boy died after consuming an unknown quantity of weed killer containing sodium arsenite stored in a shed at a neighbor's residence. The child died within 30 minutes after being taken to the hospital.

Improper storage of an insecticide regarded as highly toxic was also responsible for the death of a two-year-old boy. The preparation which consisted of 10 percent TDE and 1 percent parathion dust was placed on the back porch of the child's home. The child, playing with a hammer, broke open one of the bags and got the material on his hands. He was immediately rushed to the hospital but died 30 minutes later.

A nine-year-old boy at a summer camp died after ingesting an unknown quantity of sodium arsenite which was formulated for use as an algaecide. A 55-gallon drum containing the pesticide was found a few feet from a path between the camp lake and dining hall. On a dare from his friends, the boy drank out of the drum directly.

Other types of accidents can be cited. In Illinois approximately 80 cattle out of a herd of 300 died after having eaten feed that had been mistakenly mixed with aldrin. One year prior to the accident, the original aldrin container broke and the pesticide was repackaged in a bag that at one time contained a feed mineral supplement. Without realizing it, the owner mixed the aldrin with the cattle feed.

A family of four children, ages 16, 15, 8, and 6 and both parents were sent to a hospital a few months ago. Previously, the father had mixed poison from a mayonnaise jar marked "Poisonous Powder" with corn starch. Purpose: rat control. The mixture was placed on a shelf near a box of regular corn starch. On the night of the accident the 16 year-old daughter inadvertently used the poisonous powder in preparing hamburgers for the family evening meal. The family was hospitalized. Fortunately, the family experienced only symptoms of dizziness. The poisonous powder contained ethyl parathion.

I am sure many of you can cite other examples. Now all of us have emphasized safety of pesticides. All of us realize the need of a stronger safety program.

The Environmental Protection Agency has the responsibility to conduct a national program to investigate pesticide accidents and reports of ill effects of pesticides on man, domestic animals, fish and wildlife, crops, other beneficial plants, and other components of the environment. The Office of Pesticides Programs serves as the focal point for the Agency's accident reporting function with other accident systems, and also for the collection, analysis, interpretation and dissemination of national data.

The objectives of this program are generally twofold: to develop statistically reliable estimates of the extent and nature of the consequences of pesticides uses on man and his environment, and to provide specific cause/effect data to modify or develop programs to reduce the adverse consequences observed.

We plan to make investigative data available to the regions on a timely basis. A contract was let with a consultant firm to (1) refine investigation forms and set up a program to computerize the data, and (2) establish a pesticide accident reporting network whereby there will be an exchange of information between cooperating state and other Federal agencies and our program.

The Accident Investigation program within the Office of Pesticides Programs of EPA has a very high priority. By January 1973 we will have a pesticide accident investigation officer in each of our ten regions. The duties of these officers include the development of a regional pesticide accident contingency and investigation plan, encompassing adverse effects to man and his environment. They will develop a profile for each state which will identify (a) those agencies and organizations (government and non-government) which are now involved in reporting, receiving reports, and investigating pesticide accidents, and (b) establish within each state the nature of pesticide usage, special seasonal and geographical problems and other factors which will bring into focus probable patterns of pesticide accidents.

They will develop cooperative arrangements with other Federal agencies, and state and local government bodies, for reporting, coordinating and investigating pesticide incidents.

They will maintain liaison with state and local governments, Federal agencies and other organizations, both public and private, on pesticide safety and disposal matters, and provide consultation to state and local control program personnel and other officials.

In cooperation with concerned Federal, state, and other organizations, they will develop education needs for prevention of accidental pesticide and toxic chemical poisoning and incidents. They will also conduct safety training courses and information programs in coordination with other EPA units, Federal agencies, state and local organizations.

I have briefly given you an overview of our Accident Investigation program. I must emphasize the importance of all agencies, government and nongovernment, working together in further development of this program. Perhaps some of you have already been contacted by EPA regional personnel regarding this program.

With support from your organization in reporting pesticide accidents, the Environmental Protection Agency will be in a position to set better standards and , through our educational unit, disseminate accident investigation information to proper audiences through our safety education program.

Charles T. Mitchell heads the Accident Investigation Section of the Office of Pesticide Programs in the U. S. Environmental Protection Agency. He has done undergraduate and graduate work in microbiology at Howard University in Washington, D. C., and at the University of Pittsburgh School of Public Health. His previous work has been in registration of pesticide products in the Pesticides Regulation Division of USDA and later, EPA.

STATE REGULATIONS REGARDING PESTICIDE CONTAINERS - THE EAST

by

Charles H. Frommer
N. Y. State Dept. of Environmental Conservation
Albany, N. Y.

It is a distinct pleasure for me to be able to be here today, and I am truly hopeful of being able to come away from this conference with some workable ideas for the disposal of pesticide containers.

When Chet Gibbs approached me about two and one half months ago in regard to attending the conference, I thought to myself, "Finally someone is going to try to do something along the lines of pesticide containers and container disposal." I was even more impressed when I saw the agenda and partial list of speakers and panel members.

Then he threw me the hooker. "How would you like," he said, "to present the states' viewpoint on container disposal, New York's along with some of the other eastern states?" On the surface, this did not appear to be too great a chore but, after talking to some of the other state regulatory officials, I became increasingly aware that my report to you today would be very short and very negative.

I thought that New York was the only state that was procrastinating on the subject, but I found that, of the six or eight states contacted, only Alabama has anything that even resembles specific guidelines for the disposal of pesticides and pesticide containers. The rest of us use such weasel words as "It shall be unlawful for any person to store or dispose of any pesticide, or of any container, except in compliance with the rules and regulations of the commissioner" or "shall not be disposed of in a manner that may be injurious to human, plant or animal life or to property or which unreasonably interferes with the comfortable enjoyment of life and property throughout such areas of the State as shall be affected thereby." Or, if you are lucky, if you are really lucky, you might find more definitive statements such as "Rinse and transport the cleaned containers to the approved disposal site." You think to yourself, "Finally, an answer!" until you find out that there are no approved disposal sites near you or anywhere else in the State for that matter. Or you might see regulations that state you can burn small quantities of combustible containers.

Again you go off the high hopes, touch a match to your small quantity of combustible containers and end up paying a fine for violating the open burning law.

Some may laugh at these circumstances. But for those of us involved in the regulatory end of the problem it is no laughing matter, especially for me since most of the aforementioned "weasel words" are taken from my own state's rules which I helped develop.

I do not think that any of us, and by us, I mean the state regulatory officials, are trying to weasel out of the problem. All of the officials to whom I spoke gave me the same general answer. "We have regulations on the books but are working on additional regulations that will be much more detailed," or, "We have legislation but are working on specific rules and regulations." All of us are most anxious to adopt rules and regulations which will adequately cover disposal, that will be effective and meaningful, not regulations merely for the sake of regulations. We want rules and regulations that people can and will abide by because they are a realistic answer to a very serious problem.

Our biggest problem is that we do not have sufficient information on which to base these regulations. This is the reason we are here. There are many questions that must be answered before these regulations can be written, let alone be promulgated. How clean is clean enough? If we find that a container must be subjected to a temperature of 900° C to completely destroy the pesticide residue, and if by doing so, we destroy the sealants in the container, would we be better off raising the temperature higher and melting the container down to a usable chunk of scrap steel? Should containers be landfilled? If so, how and at what type of a site? Should we require that all containers be of the returnable, reusable type? Whenever I have broached that question to either producers or users in the past, someone usually hits the panic button, and the reasons "why not" come back in pretty rapid fire. Should we approach the problem from another direction and require that pesticides be packaged in premeasured, disposable containers that will dissolve when dropped into the mixing tank somewhat like the premeasured detergent and bleach packets your wife may use in the washing machine? That way, we would have only the clean, outer package to worry about.

We regulatory officials have many such questions, too numerous to mention here, which must be answered before effective regulations can be promulgated. I do not feel that we will find "the" answer but end up with a composite of answers.

I am here this week for two reasons. The first, and certainly least important, is to get away from the remnants of the 17 inches of snow that was very unceremoniously dropped on Albany about two weeks ago. Seriously, the most important reason for being here, other than to present this rather negative report, is to be able to talk informally with as many of you as possible in the hopes of being able to come away from this conference with a little more knowledge and a few more ideas than I came down with.

With these ideas, we can possibly begin to develop the type of disposal plan that everyone is hoping for: one that will satisfy not only the container manufacturer but also the pesticide producer; one that will not only satisfy the large agricultural users in upstate New York but also the homeowner in New York City; one that will be acceptable to the federal government and also to the responsible state and local agencies.

This is a big order but I feel it measures the seriousness of the problem. If we can work out only a few of the problems or answer just a few of the questions here at this meeting, then our time will be very well spent.

Charles H. Frommer has been Director of the Bureau of Pest Control of the New York State Department of Environmental Conservation since it was formed in 1970. He graduated with a degree in forestry from the College of Forestry in Syracuse, New York.

STATE REGULATIONS REGARDING PESTICIDE CONTAINERS
The Midwest Scene

by

Rollin M. Dennistoun
Minnesota Department of Agriculture

It has been stated that the capacity of a society to solve either the problem of sustenance or the problems posed by the production of residuals is inversely related to population density and the rate of population growth, and is positively related to its capacity for innovation in science and technology and in social institutions.

Pesticide containers fall into the category of residuals; therefore, the ability to solve this problem should be positively related to innovations in science and technology. But at this point in time, there are certainly some indications that more innovative ideas are necessary.

When I was invited to appear on this panel to discuss the midwest situation, I decided that it was necessary to contact a number of states to obtain information or ideas that they might have on pesticide containers.

Number states contacted	12
Number responding	12
Number having laws regulating pesticide containers	4
Number having regulations regulating pesticide containers	1

The questions asked and the information received are summarized as follows:

Question #1:

Are pesticide containers presently being used for highly toxic materials, e.g. parathion, adequately labeled for:

	Yes	No
Safety	11	1
Use	11	1
Disposal	6	6
Treatment/accident	12	

Question #2:

Are pesticide containers presently being used for moderately toxic materials, e.g. 2,4-D, adequately labeled for:

	Yes	No
Safety	11	1
Use	11	1
Disposal	5	7
Treatment/accident	8	4

Question #3:

Are pesticide containers presently being used for those materials commonly considered to be home or garden materials, adequately labeled for:

	Yes	No
Use	10	2
Safety	10	2
Disposal	3	7
Treatment/accident	6	5

Question #4:

What do you consider the best way to dispose of each of the following types of containers:

	H. Toxic	Mod. Toxic	Home Use
Metal	8-1	7-1	10-1
Glass	8-1	8-1	7-1
Fiber	6-1		7-1
	6-2	9-2	6-2
Plastic	8-1	7-1	8-1
Paper	7-1		5-1
	5-2	9-2	7-2
Pressurized Cans	11-1	11-1	11-1
Plastic Coated Containers	5-1		
	4-2	5-1	8-1
Biodegradable	8-1	9-1	9-1

Choices

1. Burial
2. Burning
3. Re-use
4. Re-clean
5. Recycle
6. Other

In conclusion, Minnesota has, for a number of years, been most critical of the labels on some pesticide materials. This was brought to our attention several years ago when an aerial applicator inadvertently picked up a highly toxic organophosphate material and used it to spray a town for mosquito control when, in fact, he had intended to use a chlorinated hydrocarbon. The labels of the two materials, when placed side by side were so nearly identical that they certainly could have contributed to the improper selection and use of the material.

We also feel rather strongly in Minnesota that the best way to dispose of most containers is by burning or incineration. We have had this emphasized just recently in our state when a well became contaminated with arsenic and some 13 people using water from the well became ill. It has been determined that the arsenic was buried during the 30's, possibly sometime just following a grasshopper outbreak and has only now turned up in the water supply because of the growth of the city out to what, very possibly, was an old dump site in the 30's. This, along with other problems of burial have led us to the determination that burning or incineration in properly constructed facilities will, in the long run, be the most practical, the safest, and have the least harmful effect on the environment.

Therefore, we would agree that the current environmental crisis represents one of those reoccurring times in history when technical and institutional change in the treatment of residuals has lagged relative to progress in the provision of sustenance conceived in the broad sense of the material components of consumption.

Rollin M. Dennistoun has been with the Minnesota Department of Agriculture for eight years. He studied agricultural education and agricultural economics at the University of Minnesota, where he was awarded the Doctorate degree. He has held many important posts in his state, including Secretary of the Governors' 5-State Interdisciplinary Pesticide Council, Secretary of the Governor's Board of Interstate Pest Control Commission, Director of the Minnesota School Board Association, and Chairman of its Legislative Committee. For 12 1/2 years, he has held the post of Assistant Superintendent in Charge of Agricultural Operations at the University of Minnesota at Rosemont.

STATE REGULATIONS REGARDING PESTICIDE CONTAINERS - CALIFORNIA AND THE WEST

by

John C. Hillis
Agricultural Chemicals and Feed
California State Department of Agriculture
Sacramento, California

California is a large user of pesticides with the consequent responsibilities for proper disposal of large numbers of used containers.

Accurate information on the number of used containers is not available. An indication of the number is provided by Pesticide Use Reports compiled by the Department of Agriculture which show a total of 116 million pounds of pesticides used in 1971 in terms of active ingredients, excluding home and garden use.

Industry representatives report that the majority of deliveries of liquid pesticides are in one and five-gallon containers, with some in 28 and 30-gallon sizes and a smaller number in the 55-gallon size. Most containers for liquid pesticides are metal. At present, only a small proportion of containers for commercial agricultural use are made of glass or plastic.

In 1971 the California Legislature added a provision to the Agricultural Code that it is unlawful for any person to store, transport, handle, or dispose of any pesticide or of any container which holds or has held a pesticide except in compliance with rules and regulations of the Director.

Under this authority the Department has held a hearing and will shortly adopt regulations. The regulations will apply to all pesticide users except the householder using products labeled for home and garden use.

The regulations will require that each person who controls the use of any property is responsible for all containers on the property which hold or have held a pesticide.

Unless the containers are under his personal control, so as to avoid contact by unauthorized persons, he must assign a responsible person to maintain control or store them in a locked enclosure. Containers larger than 55-gallons may meet the requirements by having a locked closure. Warning notices must be posted around all storage areas where containers which hold or have held pesticides required to be labeled with the signal words "Warning" or "Danger" are stored, and containers must carry the registrant's label.

Used containers which have held less than 28 gallons of a liquid pesticide must be rinsed and drained three times with a specific volume of water or other spray carrier immediately after use. The rinse solution is to be drained from the container into the tank mix. Other methods, at least equal in effectiveness to the triple rinse procedure, may be used but only if specifically approved by the Director of Agriculture. Containers that have been rinsed in conformity with the regulations may go to either Class I or Class II disposal sites.

Containers that have not been rinsed as prescribed must be disposed of in a Class I disposal site, or reconditioned by an approved procedure or may be retained in a holding site that has been approved by the Department.

Containers which have held dry pesticides may be placed in a Class I disposal site, or may be burned if this is done on the farmer's property in accordance with State and local air pollution requirements.

These regulations on container disposal are in effect until the end of 1974. They are considered only a short-term means of dealing with the problem. Efforts will be made to develop better disposal procedures.

Class I disposal sites are those located over non-water-bearing sediments or with only unusable ground water underlying them. The site location must provide complete protection from flooding, surface run-off or drainage, and waste materials, and all internal drainage must be restricted to the site.

Class II sites are underlain by usable ground water and may be located adjacent to streams. To protect the underlying ground water quality, a distance of separation must be maintained between the bottom of the fill and the water table. Any surface water must also be restricted from the site to preclude water from contacting the wastes.

At the present time, there are only about a dozen Class I disposal sites in the State. There are considerably more Class II sites.

Enforcement of the regulations for disposal of both waste pesticides and containers is done by the staffs of the County Agricultural Commissioners under the direction of the State Department of Agriculture.

Neighboring western states report as follows about used container disposal:

1. The State of Washington has regulations that prohibit disposal of pesticides or containers in a manner that will pollute water supplies or cause damage or injury to land, humans, desirable plants and animals, pollinating insects or wildlife. Disposal of pesticides at a site approved by the local health department complies with this regulation.

2. In Oregon, responsibility for regulation of disposal of pesticides and containers has been placed in the Department of Environmental Quality. No regulations have been adopted but the agency is planning on developing regulations. Some pesticide users are disposing of containers in sanitary landfills, others are accumulating them until official disposal sites are designated.

3. The Nevada Pest Control Act, administered by the State Department of Agriculture, grants authority to adopt regulations for the safe handling, transportation, storage, display, distribution and disposal of pesticides and their containers. At present the Department has a requirement pertaining only to commercial applicators that pesticides and containers must be disposed of in a safe manner.

4. Arizona has no specific requirements pertaining to disposal of pesticides and containers.

John Hillis has held many responsible posts in the 32 years he has been with California Department of Agriculture. He is presently Chief of the Agricultural Chemical and Feed units. He graduated from UCLA with a degree in chemistry.

SECTION VI

PROBLEMS WITH PESTICIDE CONTAINERS

Evaluation by persons representing handling, filling, transportation, storage, product use, disposal, and reuse situations

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY CHEMICAL COMPANIES

by

R. F. Uncles
American Cyanamid Company
Wayne, New Jersey

May I preface these remarks by stating that the opinions and conclusions expressed are based on consultation with a number of major producers and shippers of pesticides, and represent a valid cross section of present experience in this area.

Five or six years ago, a rash of transportation incidents involving pesticides were widely and dramatically publicized. The immediate reaction, or course, was to blame the shipping containers. The Office of Hazardous Materials of the Department of Transportation, which specifies the containers authorized for the carriage of Class B Poison pesticides, expressed deep concern about the high incidence of leakage, and enlisted the help of the National Agricultural Chemicals Association in distributing a questionnaire designed to accumulate information from producers and shippers of liquid Class B Poison pesticides with regard to frequency of container failures, the nature of such failures, and probably causes.

The results of this survey, covering nearly 900,000 shipping units from 1-gallon through 55-gallon capacity, were most revealing, both to shippers and to container manufacturers. Roughly 0.5% of the containers was rejected prior to filling. An additional 0.5% was rejected after filling but prior to shipping. Failures in transportation and subsequent storage amounted to roughly 0.1%. Causes of the failures and reasons for rejection were not too clearly defined, but the primary areas of concern appeared to be chimes, side seams, and closures.

The number of failures, though of reasonable magnitude for many types of products, was obviously unacceptable for Class B Poison pesticides with their specific areas of hazard. A task group of pesticide fillers, container manufacturers, and closure manufacturers was formed under the auspices of the National Agricultural Chemicals Association to study the problem, and within a relatively short time this group came up with three major contributions:

1. It brought to the container manufacturers the realization that their quality control and inspection procedures, though adequate in the overall, were not acceptable for Class B Poison pesticide service. As a result, they prepared a recommended procedure to be used by their industry, tightening up these areas.

2. It found that many of the reported closure failures were not actually leakers but rather were reported as such because of product left on the drum or pail head after filling.

3. It developed a container inspection procedure for pesticide fillers which was approved and adopted as industry guidelines by the Board of Directors of the National Agricultural Chemicals Association on July 15, 1969, and given wide distribution throughout the industry.

The net result of this activity, and the adoption of the group's recommendations by most all concerned, has been a drastic reduction of container failures before and after the filling operation. There is evidence to show that this figure now approaches 0.01%, or one unit per ten thousand delivered.

We can say, therefore, that container problems as seen by fillers and formulators are minimal, and can be kept at low levels by constant vigilance to ensure that adherence to manufacturing specifications, verification procedures, and quality control inspections is maintained.

This is not to say that there are no container problems. We frequently hear reference to rough and careless handling by carriers and others involved in the distribution system, to problems of decontamination and disposal, and so forth--but these areas will be covered in following panel discussions.

One final comment. The net result of this conference may very well be the promulgation of still more regulations governing the packaging, handling, transportation, and use of Class B Poison pesticides. We cannot hope for simplification, but may we at least plead for consistency.

Thank you.

Robert F. Uncles is Manager, Packaging and Labeling, Department of the Transportation and Distribution Division of American Cyanamid Company. He is a member and past chairman of both the Chemical Packaging Committee of the Manufacturing Chemists Association and the Bag Committee of the Packaging Institute. He is also a member and past secretary of Committee D-10, Packaging, of the American Society for Testing and Materials (ASTM).

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY TRUCKERS (HIGHWAY)

by

Henry B. Lewis
Central Freight Lines, Inc.
Waco, Texas

Before I start, I'd like to make some comments concerning the general topic of the conference here these 3 days. I'd like to comment just a minute on a question that was directed to Mr. Burns this morning concerning the compliance with the hours of service regulations. I think that I'm proper in stating so in defense of the industry: true, I must admit that there are violations of the hours of service regulations; but the majority of the motor carriers are very sensitive about the hours of service regulations (those of us who are bound by them), and our sensitivity has created a great deal of compliance. So I think in all fairness and to dispel any unfair indictment of the trucking industry in general, I would like to clear that up.

I am somewhat privileged to be in attendance because this is an education for me and because this field touches us in the motor transportation industry and the other transportation industries somewhat indirectly. We have heard from many of the container manufacturers, and it is very encouraging to see some of the accomplishments that are being made and are likely to be made in the future, particularly as they apply to our facet of the transportation system.

I'd like to begin by saying that I think that the problems of the human environmental exposures that result in control and confinement of Class B poisons more particularly during transportation must be fully understood. First, we must be realistic in the fact that today's society demands service in LTL movements. People want their goods "now". Legislative members are frequently contacted by businesses in their community to do something about freight service. We are continually faced with this problem and we are under a great deal of pressure to render the service that our society requires. Regulatory bodies, ICC and the state bodies, must see to it that carriers perform a proper service under their operating authority. This is important also when a carrier makes application for any additional authority that he might desire, to serve other communities. Their service quotient is very seriously considered if they are to receive the authority that they have requested.

Second, consider if you will, that the distribution carrier will handle approximately 20,000 shipments in a 24-hour period. These shipments can range all the way from childrens' clothing to sophisticated electronic equipment and everything in between, including radioactive materials, explosives, and pesticides. Just about every commodity that man uses is brought together at an assembly point for rapid distribution.

However, some of the problems created by this environment are outlined. One, of course, is time of service; time of service is "the name of the game." Another, and probably more difficult to overcome, is that in many cases the shippers failed to meet their responsibilities and compliances with the DOT regulations. I think, fellows, that it is hard to believe but many small formulators and small backyard producers of pesticide commodities act as though they are far removed from the responsibilities that they are obliged to comply with, such as DOT packaging requirements, DOT labeling requirements, certification, and notification to the carrier. I think it would be rather astounding if you had some figures on this. I don't have any but it's quite far-reaching. This means then that many shipments do not possess the necessary ingredients for safe transportation.

Now I'd like to give you a couple of examples, if you'll permit me just a moment to show you, which bear out what I'm trying to say. In our area in the state of Texas, a great deal of parathion is being used. And parathion, of course, being as hazardous as it is, has become almost a by-word in our training efforts. Really, we understand that there are many, many other commodities that are hazardous, maybe not to the same degree, but enough to give us great concern in the course of transportation. As a result of this fact we have been able to almost frighten people to the point where, if you mention parathion, they turn around and throw their hands up in the air. It is a frightening word and it demands their extreme attention and caution in handling.

One of the examples that I want to relate to you concerns a formulator in the area of Waco, Texas, where our home office happens to be. He does most of his transportation by private carrier, but occasionally he will tender his product to a general commodity carrier. His bill of lading simply reads X number of cans, 5-gallon cans, or pails, (as you might want to relate them,) of a named product or just "agricultural chemical NOS." Well, to the average truck driver and the average dock man, it is pretty hard for him to discern whether he is handling a bulk shipment of parathion or some less hazardous commodity. But unfortunately, in this case, the containers did not bear the required poison label DOT requires on a commodity or a container that is in the Class B category. We paid him a visit and we explained to him what his obligations were. He simply said, "Put the label on there if that's what you want." We offered to pass it on to the Bureau of Motor Carriers safety people to come by and visit him, and to further instruct him as to what the obligations were under the DOT regulation. He said, "For God's sake, no! We're having enough trouble with the Department of Agriculture as it is." So there's some sort of reluctance, at least in this man's case, to be further involved. We did make this correction and he is now properly identifying his product and properly applying the label.

Another incident that occurred in Houston involved a shipment of 75 five-gallon containers of parathion going to the city of Dayton. The shipper was a small formulator, warehouser and distributor, and his shipment showed 74 containers and 1 container leaking. Well, these were described on the bill of lading without the proper notification and certification. As far as the driver was concerned, he had no knowledge as to what he was picking up.

You know, in our business, whether we like it or not, we try to serve the customer, we try to take care of our business, we try to receive the freight and handle it as expeditiously as we know how, and we are confronted with situations such as this. You know it's rather difficult to try to instruct an individual, a driver, a freight handler on our docks, or many of our supervisors who are not chemically oriented.

At this stage I would like to know personally if there's anyone in the room who could enlighten me at some later time before the meeting is adjourned as to how many pesticides with a Class B classification are moving in transportation. Because at one time or another, a distribution carrier such as ourselves might have as many as a dozen of these products in one general area, many of them, unfortunately, improperly defined.

I have no quarrel with the major manufacturers; they do a tremendous job and they work with us. We've been very fortunate in having a number of them in our area. When we have a spill or leak, immediate notification is given to these people, and they send out at their own expense decontamination crews, and work with us in every way.

You know, this problem of communication is an interesting thing. We didn't know until recently that this decontamination service was even available to the motor carrier industry. Through the auspices of a little imagination and a little ingenuity, we formed what we call the Texas Hazardous Materials Council. The purpose of this Council was to bring interested people in the area together to try to communicate or to have some forum where we could understand what was going on and what needed to be done. In case (let's say), a truck-load of methylparathion in 55 gallon drums was involved in an accident (and accidents do happen, as you well know), and it turned over in some isolated spot in west Texas. Let's say the highway patrol, Department of Public Safety was called on to investigate the accident. Without proper notification, (which has happened), and without proper placarding, this officer and many others that might stop by as onlookers could be exposed to a very serious situation. If these containers ruptured as a result of the impact of the accident, they could spill over into ditches and we could have quite a catastrophic situation. So we brought the law enforcement people together, the fire fighters, (of course, we're talking about all hazardous materials, the ag chemical as well as the general chemical area), the Department of Health in the State of Texas, the Highway Department (for clearing of the highways in case of exposure or mishaps), the DOT, the chemical industries, the railroads, and the warehouse people, much in the same fashion as is being done here today. And at this stage in time and point of the game, we finally got people together and created at least a better understanding so that we in the motor carrier industry could do a little bit better job in the safe transportation of these commodities.

I'm not standing up here and trying to pass the buck or make excuses for our industry; I'm simply trying to point out, as I was asked to do, some of the problems that confront us. Regulations and the many other things that you can talk about from here on are not going to solve, as the man said, human failure. Human failure is going to be with us as long as there are human beings. But we need education through a good public relations program. This is what, in my judgment, it is going to take. We need to get down together everything that's being done here.

Now, we have a problem, fellows; we've got a serious problem in receiving these commodities, many of these that are improperly identified. Most of the education in this area is being done by the motor carrier industry. Not in deference to Mr. Burns this morning, but on many occasions, we use this very simple booklet which is published by the American Trucking Association. It is written in an understandable way where the average shipping clerk, or the average manager of a small formulator can read it and see what his obligations are without thumbing through many, many pages of regulations in trying to discern what he is required to do. This is a real handy little booklet. We passed out at our own expense many of these to these small shippers. Mr. Burns made reference to it.

Mr. Burns was rather critical of the carriers' failure to report incidents. I'm not up here with a white hat and I'm not trying to tell you that we're clean. We understand more now, probably, than we did a year ago why this reporting is so vitally needed to give some indication as to the adequacy of the containers that these commodities are moving in. And I can assure you, as well as Mr. Burns, that the carrier industry will work much more diligently to try and furnish this information to OHM (Office of Hazardous Materials).

There has been some commentary concerning the ratio of leaks versus the total number containers, that have moved in transportation or have been produced, and that the ratio seems to be very encouraging. Possibly we are guilty for not giving a better picture in this area, but I would like to relate this to you also. The time is right, the place is right, the commodity is right, and we could very easily have another "Tijuana, Mexico." The regulations requiring carriers not to transport Class B poisons with food stuffs or animal feeds is fine as long as the shipper will tell us enough.

I want to make a few offerings for the motor carriers, and I think I speak for many of my colleagues. Fiber drums over paper bags: I don't want to alienate the affections of a good man that spoke on paper bag industry yesterday. Fiber drums in LTL service, more particularly where you can mechanically handle, are much more satisfactory for the protection of the commodity than is the paper bag. Now, paper bags would be fine if we could have them palletized, but there should be no overhang over the pallet and they should be banded and covered.

I'd also like to mention (and this has already been covered in improvement of closures) symbols on containers for toxicity. I know this is a bugger that no one can really come up with, but it sure would help us do a better job.

And, for God's sake, please encourage people to understand that "STC" means simply "single trip container" and not "stick the carrier."

Thank you very much.

Henry B. Lewis has been Director of Personnel Safety at Central Freight Lines, Inc. since 1968, and Director of Safety since 1954. He has been on the Board of Directors of the company since 1969. He graduated from St. Marys College in San Antonio, Texas.

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY TANK TRUCK CARRIERS

by

Clifford Harvison
National Tank Truck Carriers, Inc.
Washington, D. C.

When a speaker who precedes you gives essentially the same talk you plan on giving, you have to be most careful to define your differences. The gentleman who preceded me to this microphone spoke of many of the problems faced by the general commodities carriers in the movement of pesticides.

National Tank Truck Carriers, Inc. represents the for-hire side of the tank truck industry. That is, we haul products in bulk -- as opposed to packages or small delivery lots. Essentially, the for-hire tank truck industry does not haul pesticides or grain fumigants or any other products that are classified as Class A poisons. They, of course, are classified by the Department of Transportation as hazardous materials. The for-hire tank truck industry is mainly involved in the transportation of flammable liquids, acids, liquid petroleum gases and other non-hazardous dry bulk products.

The for-hire tank truck industry is most sensitive about DOT-defined "hazardous materials", as the gentleman who preceded me stated. In other words, when we note a placarded shipment on a bill of lading or our drivers or handlers see that "flammable" on the bill of lading -- a red light automatically goes off (at least we hope it automatically goes off) in the driver's mind.

However, with the pesticides we generally haul -- that is, those of the non-dangerous variety -- that "red light" may not appear. For this reason, we are perhaps guilty of being a little "blase" about it, and the old communication gap comes up real quickly.

I have talked to a number of carriers in the Mid-west prior to coming down here to make this presentation, and we are finding, very frankly, that it is an almost unanimous opinion that the carrier is not getting the type of information from the manufacturer that he needs in order to cope with a particular incident that might occur during the transportation of one of your shipments. Now, while I use the term "manufacturer," many individuals throw the word "shipper" around all too freely. I am hoping to explain the difference. Frankly, we in the for-hire tank truck industry look to the manufacturer (who may or may not be the shipper) to supply the base information. We feel that it is the "manufacturer" who knows best the hazardous properties of his particular product as well as the reactive capabilities of that product -- particularly with water.

The "shipper" may not have this information since he, in reality, may not be handling his own product. This is where the tank truck area comes in. Products shipped under a variety of "trade names" do not necessarily contain manufacturer information and, as a result, when we get involved in an incident (let us say a spill or the rupture of a tank vehicle, involving loss of product), the only thing the driver and emergency personnel have to deal with is the bill of lading and whatever information -- or lack of information -- that may contain.

Here is a very good example. About three months ago, a carrier in the Northeast part of the country overturned a load labeled pesticide into a reservoir. It was not a hazardous commodity, but the reservoir closed down. This was in the middle of the business day, not a week-end or at two o'clock in the morning. The town literally shut down for four hours before the proper phone contacts could be made. It was eventually found that not only was the product not hazardous but probably spilling the stuff in the reservoir did as much good for the reservoir as it did harm.

So, gentlemen, again let me reinforce, without being repetitious, that there must be a way devised either regulatory-wise or voluntary, to give the bulk carrier the proper background information as to what he is handling. And this information must be immediately utilizable by emergency personnel.

Clifford J. Harvison is Managing Director of National Tank Truck Carriers, Inc. with headquarters in Washington, D.C. He received a B.A. degree in Journalism from Duquesne University in Pittsburg, Pa., had active duty in the U.S. Army Transportation Corps, and later, became Assistant Director of Public Information for the Army's Transportation Terminal Command (Atlantic). Since July 1965, he has held several positions with National Tank Truck Carriers, Inc.

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY RAIL TRANSPORTERS

by

A. F. Grassmuck
Association of American Railroads
Chicago, Illinois

Unlike the truckers, as you probably know, the railroads are practically out of the LCL business. Therefore, most of my remarks, as far as rail transportation is concerned, will deal with carload shipments.

I am with the Association of American Railroads which represents probably 95% of the rail carriers in this country. Within the framework of the AAR is the Bureau of Explosives which I represent. We deal exclusively with transportation by rail of hazardous materials under provisions of the DOT regulations.

We also have a Freight Loading and Container Section which does essentially the same work with non-hazardous materials. We both perform somewhat the same function having to do with packaging, loading, blocking, bracing, and handling in rail transportation. We both issue car-loading pamphlets, and our Bureau's pamphlets are mentioned in the DOT regulations as recommended procedures for the blocking of freight for rail movement.

Both sections are involved with the movement of pesticides, with our efforts (that is, the Bureau of Explosives) being confined to those classified as poisons under the definitions in the DOT regulations. While we have no breakdown as to the percentages, there are probably more nonregulated pesticides than regulated pesticides being offered for transportation.

We have reviewed our files and also consulted with the Freight Loading and Container Section, and we do not find that (currently) pesticides are involved in any more instances of damage and spillage than other materials. This is largely due to the efforts indicated by Mr. Uncles in his presentation, and also because alot of the difficulties which did exist in the past have functionally now been overcome. This by no means infers that we experience no difficulties with pesticides, since over the years, all carriers have instances of leakage and spills of many materials and from various causes.

The main difficulty of spills with pesticides, particularly those classified as poisonous, is the fact that by their very nature they present somewhat of a unique problem when they occur during transportation. On several occasions it has been necessary to physically remove floors of boxcars and trailers with a skill saw when a liquid parathion spill has taken place. Likewise, decontamination measures have been necessary where organic phosphates have been spilled. Fortunately, the skill saw is not used as frequently as it was in the past.

Insofar as transportation is concerned, and being very basic and probably over-simplifying the matter, three things are required. These are proper packaging; proper loading, blocking, and bracing; and proper handling during transportation. As I say, these are very, very basic. When these fundamentals are followed, and eliminating pure accidental derailments, safety and transportation records reveal that most shipments arrive at their destination in an undamaged condition.

I do want to echo the two preceding speakers, but it is vitally necessary and it is the requirement of the DOT regulation that shippers, on their shipping papers, inform the carriers as to the nature of the commodities being offered for transportation. Some time ago, the DOT regulations were revised and it is now necessary for conductors of train crews to have in their possession copies of the shipping papers describing the commodities by name and their hazard classification. Obviously the railroads cannot comply with this if they are not furnished this material by the shippers.

A. F. Grassmuck, from Chicago, Illinois, is Military Assistant, Bureau of Explosives, of the Association of American Railroads, headquartered at Washington, D.C. He began his career in the commercial explosives industry, and was Ammunitions Officer, Army Ordnance Corps, during World War II. Since then, he joined AAR as Inspector, Bureau of Explosives, and was appointed to his present post in 1963.

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY PESTICIDE FORMULATORS AND DISTRIBUTORS

by

Roland L. Rhodes
United Pesticide Formulators & Distributors Association
Kansas City, Kansas

It is a pleasure to be asked to participate with you today, on behalf of the United Pesticide Formulators and Distributors Association. Our member firms are engaged in the formulation and/or distribution of pesticides to the structural pest control industry. These products are used in termite control, general pest control, fumigation, weed control, bird management, rodent control and area mosquito control.

In recent years, more and more of the basic pesticide manufacturers are offering formulated products for distribution to the industry, rather than offering technical materials to formulators. This now places the problems of disposal of excesses and containers more in the "hands" of the basics because there are fewer firms formulating pesticides today. Another reason for the reduction in number of firms formulating products is the increased costs in product registration, making it unprofitable for the small formulator to continue operations. An example is rodenticide bait acceptance tests.

Therefore, our problems relating to pesticide containers centers more in the areas of warehousing, transportation and distribution of pesticide products.

A. GLASS CONTAINERS, gallon jugs in 4/1 gal. cartons.

Problem: We still receive quite a few products in gallon glass containers, resulting in:

1. Breakage
2. Weight of glass (increased freight costs)
3. Lack of carton to reship or deliver single gallons to customer.

Recommendation:

Breakage - Some manufacturers are using thicker walled cartons with liners. A few are using individual reshipper cartons for gallon jugs in 4/1 cartons. This reduces breakage in shipment of cartons from manufacturer to distributors, and in the delivery to the user of single gallons.

Weight - As lighter weight containers become available, a switch to lined cans (preferably) or plastic bottles could take place, provided economics are acceptable. We are now receiving Baygon L.C., Dursban 2E and Diazinon 4E in gallon containers. If possible we would like to recommend that Chlordane 4 lb. and 8 lb., Dieldrin 1.5 lb., Vapona 2E and Malathion (Cythion) 5 lb. be packed in gallon cans. These latter products are still being packed in glass jugs.

B. DUSTS

Problem: Breakage in 50 lb. bags - very messy and contaminates surrounding merchandise in truck and warehouse.

Recommendation: Fiber drums or poly-bags in cartons.

C. LABELS

Problem: Similar-appearing labels cause confusion in the warehouse, and in transportation of products.

Recommendation: Different colors of same design, or contrasting label design.

D. GROSS WEIGHT

Problem: Gross weight of product in excess of 50 lbs. requires shipment by truck line. Many products that weigh less than 50 lbs. can be shipped by U.P.S., E.F.D., Mistletoe Express, buses or similar carriers at less freight cost.

Recommendation:
Manufacturers and formulators adjust gross weight of package to less than 50 lbs. on those products to be reshipped by distributor.

E. Regulations on LTL quantities.

Problem: How are LTL quantities of certain pesticides going to be allowed to move in interstate commerce, with restrictions on warehousing and transportation?

1. Regulations regarding restriction of shipment of certain pesticides, via common carrier, in same trailer with food and/or clothing.
2. Regulations regarding warehousing of certain pesticides near food and clothing.

Recommendation:
Need guidance in this area; otherwise we'll wind up receiving products from manufacturers that legally and/or economically can't be reshipped in small quantities by common carrier to our customers.

As those of you in industry develop and market products and containers, and as those of you in government establish rules and regulations, please keep in mind that the marketing process is not complete until the product is in the hands of the ultimate user.

Thank you for allowing our Association to contribute some input into this Conference.

Roland L. Rhodes is President of Rhodes Chemical Company in Kansas City, Kansas, and is also current president of the United Pesticide Formulators and Distributors Association. He graduated from Kansas University with principal training in chemistry and zoology. He was a chemist with Stokeley-

Van Camp Company, Chief Chemist with FMC Corporation (Westvaco - Kansas), Manager of Research and Development Department of Real-Kill Company (Division of Cook Chemical Company), and Manager of Pest Control Supplies, Division of Conservation Industries, Kansas City, prior to his present position. He has been active in the National Pest Control Association and is an allied member of several State Pest Control Associations.

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY CONTAINER HANDLERS

by

E. A. Cancienne
Louisiana Agricultural Aviation Society and
Louisiana Cooperative Extension Service
Baton Rouge, Louisiana

It was most fitting to have the aerial applicators appear on this panel for they apply the bulk of the agricultural chemicals used nationwide. In many instances, the aerial applicator has a choice of the type of container in which he will receive his material. This choice is based on:

First, economics. The larger the container, the less expensive the material.

Secondly, he has to consider the ease in handling of the containers. Normally a 30-gallon drum is about the most economical and convenient for him to handle for his purposes.

Thirdly, he has a problem with storage. At the peak of the season, his storage facilities are limited and a great amount of this material is going to have to be stored outside. So he has a problem with weather, and the container must be a weather-proof container.

Fourth, and very important, is disposal of the used containers. This is his biggest problem. He handles each season (depending on the size of his operation) from several hundred to several thousand containers. And EPA's proposal to reduce and perhaps eventually ban the use of the persistent pesticides will increase the amount of insecticides that he is going to use, since he is going to have to go to nonpersistent types of pesticides and this will increase the number of applications on the crop. This increase in the amount of pesticides he'll use will certainly increase the number of containers he's going to have to dispose of.

Our aerial applicators are pretty well informed on pesticide safety. This has been drummed into them for years through their state and national aerial applicators associations. Then, too, the representatives from the extension service of land-grant colleges constantly harp on pesticide safety, so they know what the problems are and they know that they need to take this into consideration. These people are working with highly toxic materials every day and they know the consequences of carelessness in handling these materials.

We know that metal, glass and plastic containers should be rinsed before they are disposed of. Our aerial applicators do this as one of the steps in their mixing operations. There is no problem with 30-gallon drums and smaller containers, but the 50-gallon drums are a little more difficult.

Paper and fiber containers are usually burned on the airstrip. Now some of the states are passing regulations preventing this. I don't know how the aerial applicators are going to handle this; this is going to be a problem. We must have a practical and economical method devised for them to dispose of containers. Until such a method is developed, they will continue to stockpile these containers and dispose of them in any way they can. There is no question but that the aerial applicator is more interested in the development of a reusable container or a practical method of disposal of used containers than any other segments of the agricultural industry. He handles most of the kinds of pesticides, and has the problem of disposing of these containers.

Some of our aerial applicators, in order to alleviate this disposal problem, have gone to bulk handling of pesticides. Now I know this will raise the eyebrows of some of you, and perhaps the legality of such an operation may be questioned.

Aerial applicators during a single season may apply a dozen or more different materials or mixtures of materials, but from these dozen or more he'll probably use 2 or 3 for about 95% of his application work. Bulk storage tanks at the site will greatly reduce his need for having to handle large numbers of used containers. This type of pesticide handling, or course, would present a problem as far as transportation of bulk insecticides. Now I understand that it is most difficult to get a transport approved through the Department of Transportation to transport these pesticides. But I'm sure that this can be worked out if it is determined that this system could reduce environmental contamination due to used pesticide containers. I also realize that this type of operation wouldn't be too popular with the container manufacturers, but if this problem of disposition of used containers is as serious as the environmentalists say it is, we may be forced to follow this course.

Thank you.

E. A. Cancienne is Extension Entomologist with the Louisiana Extension Service and is the Executive Secretary of the Louisiana Agricultural Aviation Association. A native of Assumption Parish, Louisiana, he grew up on a sugar cane farm, completed graduate studies at LSU in entomology, and served as a deck officer in the U. S. Navy (Pacific) during World War II. He joined USDA Bureau of Entomology, then went to the Louisiana Department of Agriculture, and held the post of State Entomologist from 1956-1960.

PESTICIDE CONTAINER PROBLEMS ENCOUNTERED BY THE HOME AND GARDEN USER

by

Harrison Dooley
Environmental Protection Agency
Corvallis, Oregon

Industry has provided home and garden users of pesticides with many "easy-to-use" packages and containers. However, more attention must be paid to childproofing, rate of application, effectiveness, leakage, and safety of use. Containers play an important role in the success or failure of these considerations.

It must be remembered that many users of home and garden type pesticide products often know little about pesticides, their safety, or their use. The information they receive may be from a clerk who may know little more than the purchaser. This makes writing of labels very important. Writing an effective label may well be as important as the research which supports the registration of the product.

Excellent containers for pesticides that the average home owner purchases are very important for safe use and storage. Home and garden pesticides are sold in many types of retail outlets such as feed stores, groceries, fruit and vegetable markets, drug stores and hardware stores, to list a few. Grocery stores, fruit and vegetable markets are of particular concern because leakage of pesticide containers may occur, contaminating food items being offered for sale. Pesticides and fruit and vegetables are often displayed within a few steps of each other. Purchases of food and pesticides are placed in the same basket. The clerk or boxboy may or may not separate the pesticides and food items. A small child may want something to eat on the way home. So the child's mother gives the child an apple with spilled pesticide on it. The child becomes ill and no one knows why. The example, which may be somewhat extreme, illustrates the importance for pesticide containers of the highest quality.

Education of the public by advertising and other means regarding safe use and storage of pesticides, especially home and garden packages, is very important and cannot be overemphasized.

Pesticides are packaged and sold to the home and garden market in many sizes and types of containers. Many are colorful, eyecatching, and a few are unique. Considerable effort has been invested in simplification and particularly convenience types to induce the homeowner to choose one product in preference to another. In a market where competition is keen and the zeal to increase sales holds a high priority, problems may develop; some are foreseen, perhaps, while others are not. This presentation, however, deals primarily with some of the problems encountered by the homeowner in the use and storage of pesticides due to container type or design.

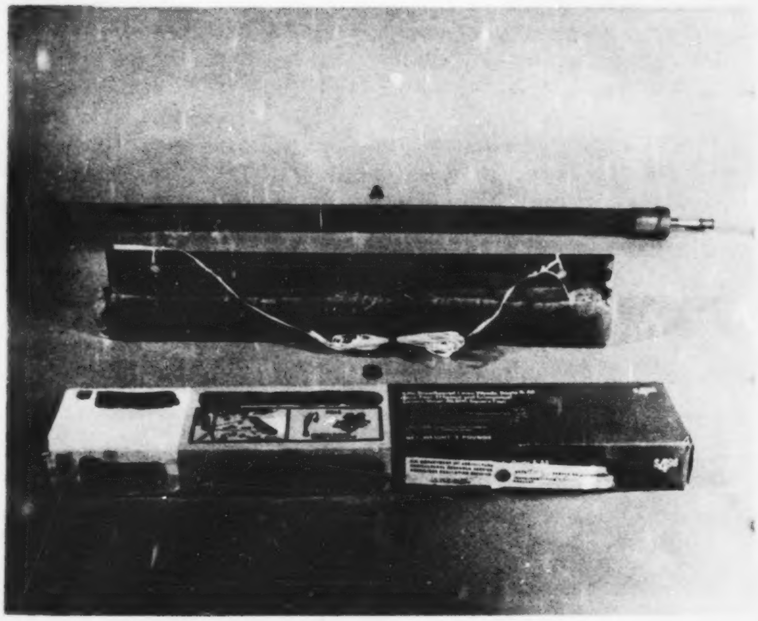


Figure 1

Spot application of herbicides is easy with a stick applicator package (A). It works well except the plunger occasionally sticks. If this happens, the user may get the material on the hands unless gloves are worn.

Another form of weed killer is a wax bar containing 2,4-D (B). This bar is packaged in a heavy paper box (C). However, the bar is difficult to remove and replace without getting the wax on the hands. This bar is used to control broadleaf weeds and is easy to use by slowly dragging over the lawn. The user should wear rubber gloves when removing the bar from the package because the wax is difficult to wash off with soap and water.

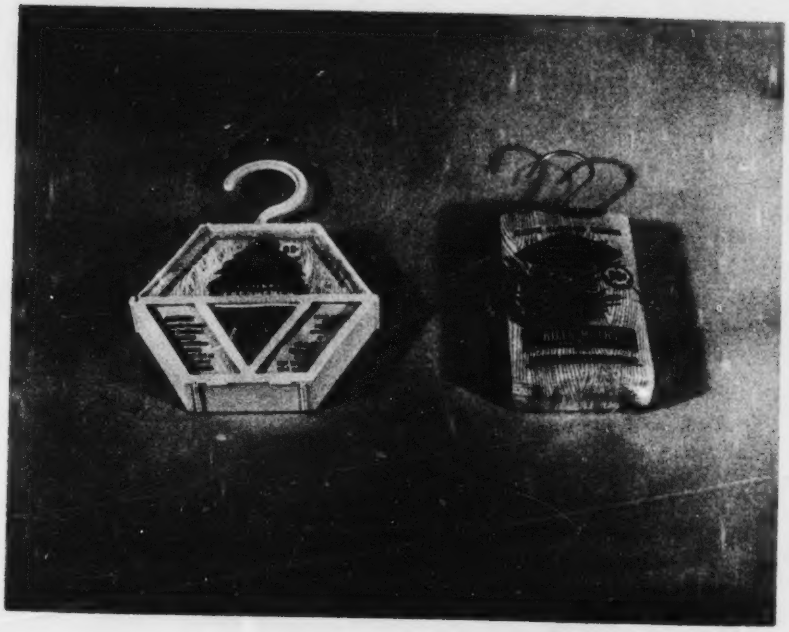


Figure 2

Another type of pesticide commonly found in the home is the closet freshener. These are crystals of paradichlorobenzene, intended for moth and mold and mildew control. Two examples are shown in Figure 2; one has a plastic shield around the perimeter, presumably for childproofing, the other does not.

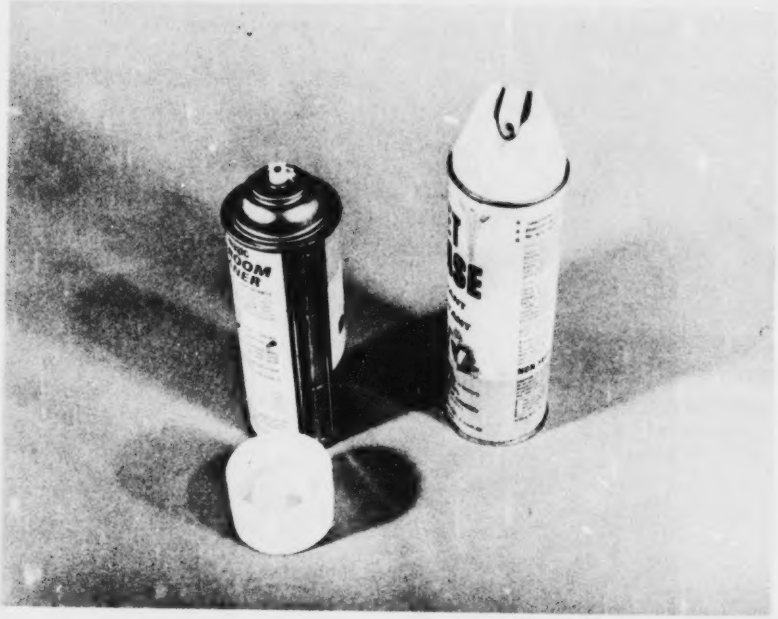


Figure 3

Pressurized sprays or "aerosol" type containers are used as packaging and application for several different types of pesticides. They are used for mold and mildew control, insecticide, fungicide, herbicide, and plant growth regulator products. These containers are easy to use. Since these are so popular and are so varied, one important consideration is certainly from the standpoint of use.

Aerosols and pressurized sprays used for mold and mildew control, such as the two in Figure 3, are ordinarily effective for the purpose intended. The directions for use claim disinfection or perhaps sanitizing of telephones, table tops, different types of cloth, water closets, etc., wherever microorganisms are harbored. Note the different types of tops. One has the trigger covered by a cap while the other has the trigger indented into the cap. The covered trigger is better, because it cannot be used without removing the cap.

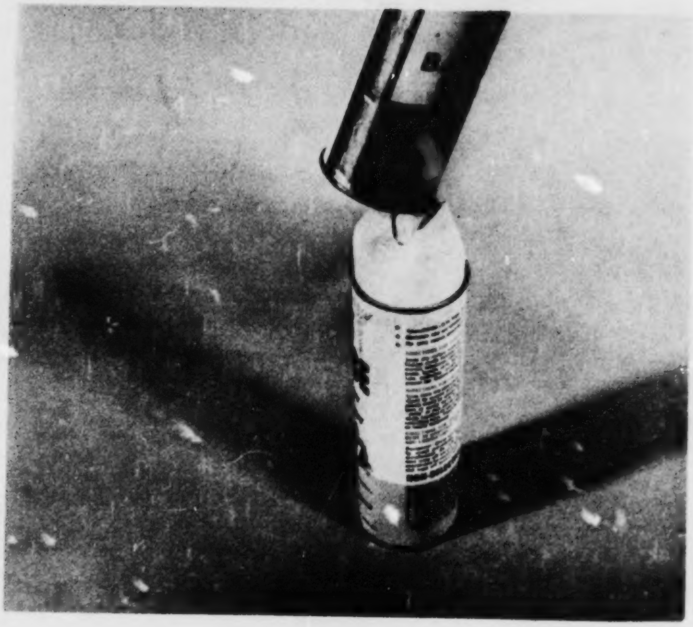


Figure 4

The indented trigger can be set off by the edge of another container, such as in Figure 4. Containers that are easily triggered are not deemed safe where children can play with them (such as on a store shelf or at home).

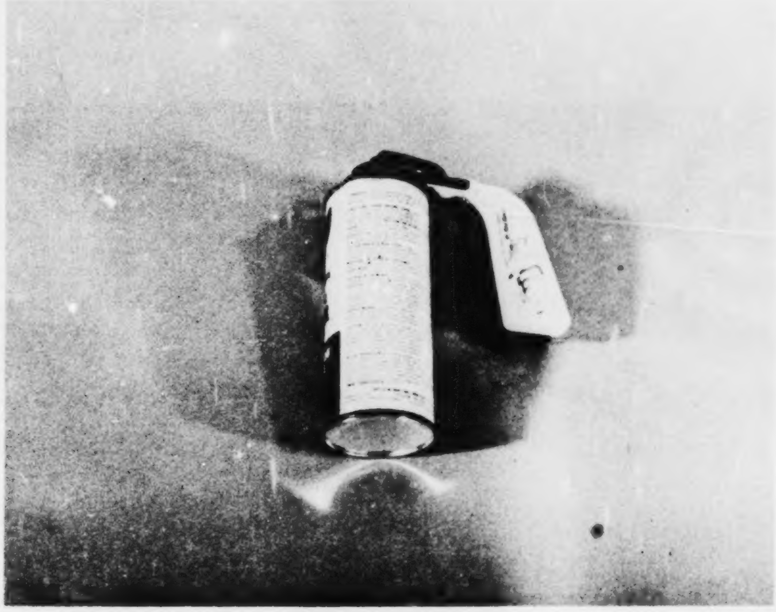


Figure 5

For applying fungicides and insecticides, similar containers are used for the control of mold and mildew. One of the greatest disadvantages of this type of container for application to plants is the phytotoxicity of the propellent. If too much of the contents is applied, leaf burning and spotting may result due to propellents and solvents. Another disadvantage is that the contents may accumulate on the trigger. This depends upon the type of formulation, and is not the case for all. The advantage is ease of application. It would be advantageous to the user if companies would supply snap-on spray can handles such as shown in Figure 5. This would help avoid the contents getting on the user's fingers. Plant growth regulators, herbicides, and pruning paints are also packaged in similar types of pressurized containers.

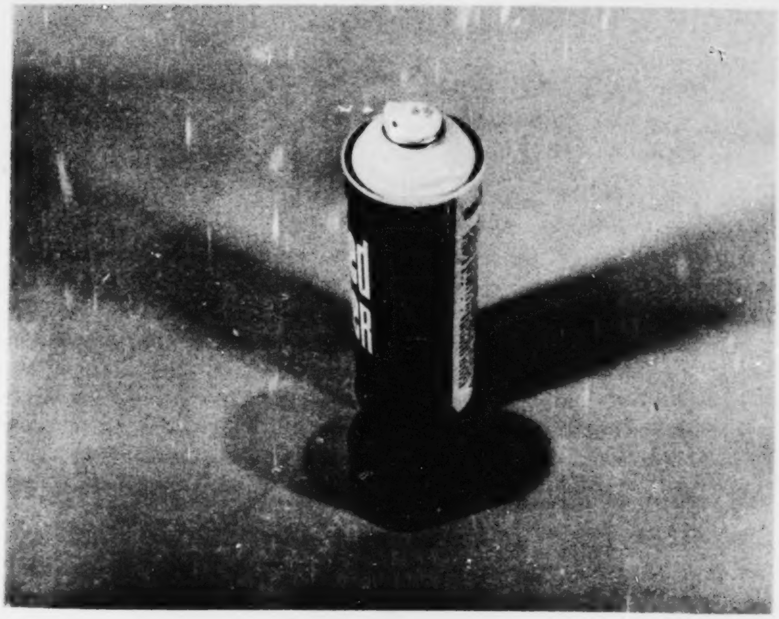


Figure 6

Another type of pressurized package is shown in Figure 6. This container is used for a foam type formulation of 2,4-D. It is intended for spot treatment of broadleaf weeds. The advantages are ease of application and control of drift. Yet it is possible to get foam on the trigger finger during application even though there is an extension on the trigger. The precautionary statements tell the user to wash his hands after applying the product, but a better trigger design would prevent the problem entirely.

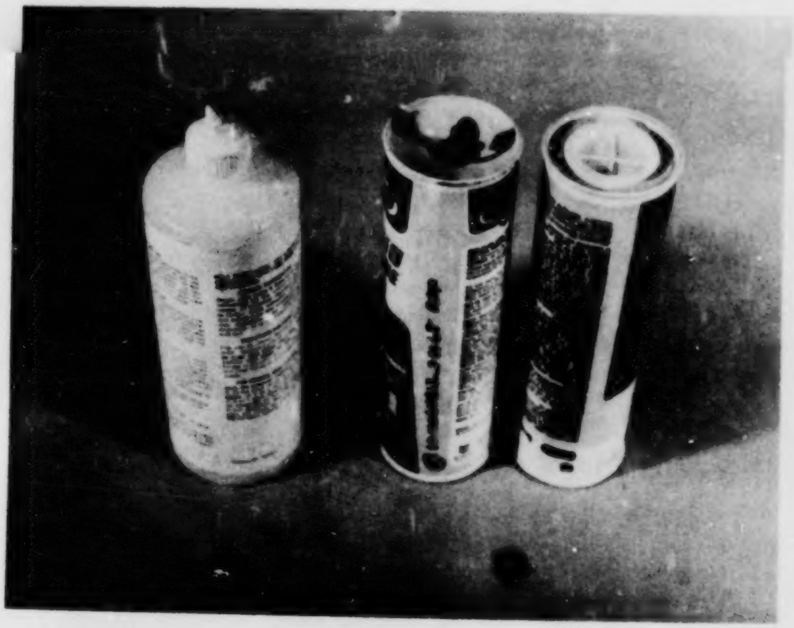


Figure 7

Plastic squeeze containers with flip-tops such as shown in Figure 7, are used to spot-treat weeds with herbicides. The small stream discharged is difficult to control, however.

Plastic squeeze duster containers are used to apply fungicides and insecticides to plants. These containers are easy to use and are relatively inexpensive. However, containers of this type have several disadvantages. The rate of application may vary enormously, depending upon the applicator. This type of container often shoots a stream of dust instead of a cloud. A desirable rate of dust application is equivalent to about 50 pounds per acre. The type referred to will apply from 70 to more than 200 pounds per acre, depending upon the pressure applied, container position, and size of dust particles in the formulation. Other disadvantages of this type of container are spillage while refilling and filling of the closure. A similar container is made of paper and has many of the same problems. The paper containers will occasionally collapse from use, also.

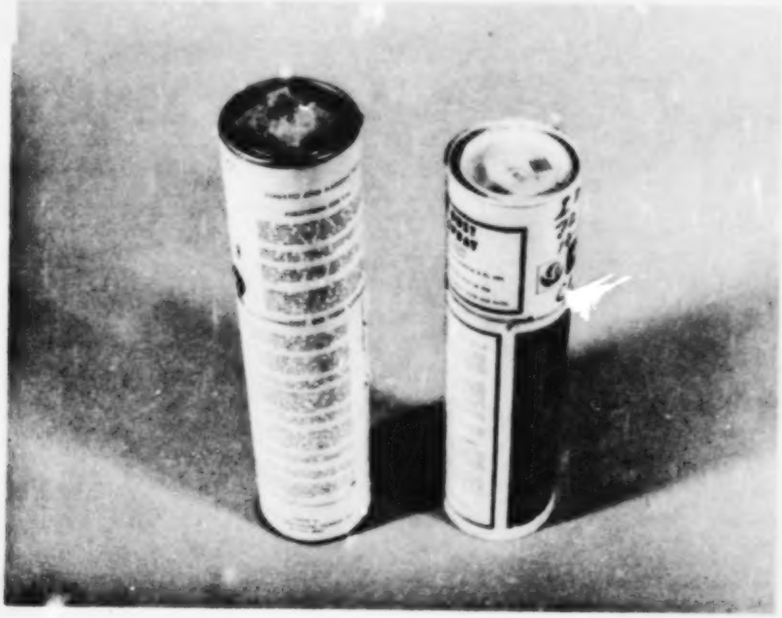


Figure 8

Pump gun duster containers are generally quite satisfactory (Figure 8). These are good but often more expensive than the plastic squeeze type products. This type can be controlled more easily by the applicator, but dust may escape and may contaminate the applicator's hands.

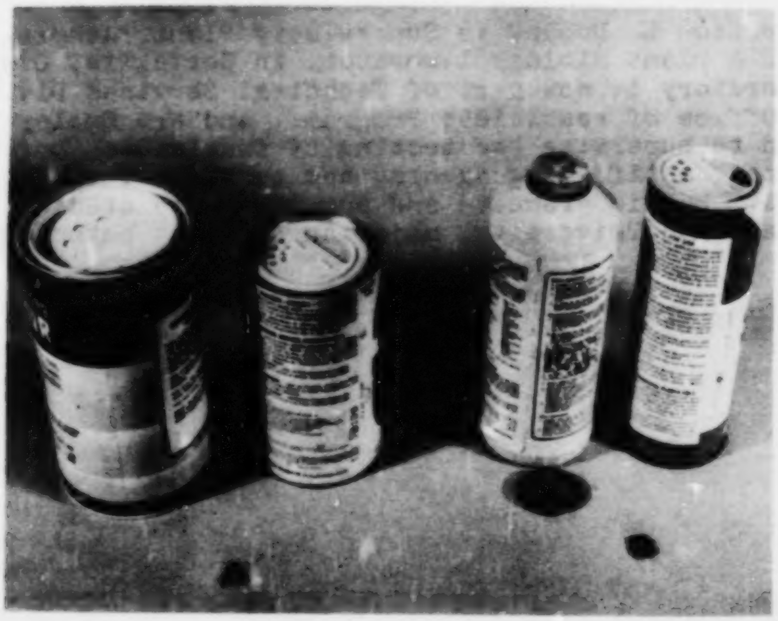


Figure 9

Sifter can containers are relatively new to the market place (Figure 9). This type has several drawbacks. Sifter containers with plastic tops usually leak before they are opened. The application is generally excessive; thus, the excess must be knocked off plants to prevent damage. The dust usually gets on the user's hands. The metal top containers may be provided with no means of closing after the contents are partially used. Some products of the type found in these containers cite directions for use in hand sprayers. However, if plastic tops are used, they frequently break when opening to empty contents into a sprayer. The advantages of these containers appear to be outweighed by the disadvantages.

Sifter cans are generally satisfactory for applying granular herbicides. Even granular materials may leak from the plastic topped containers, and if left in the sun, the top may warp. However, the plastic sifter top is the better of the two types because it can be reclosed.

Harrison L. Dooley is Supervisory Plant Pathologist at the EPA Plant Biology Laboratory in Corvallis, Oregon. The laboratory is now part of Technical Services Division of the Office of Pesticides Programs, and Mr. Dooley is required to supervise the testing of fungicides, herbicides, algaecides, antifouling agents, and certain of the pesticide products. He did graduate and undergraduate studies at Oklahoma State University, majoring in plant pathology and botany.

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY PEST CONTROL OPERATORS

by

Roland L. Rhodes
United Pesticide Formulators & Distributors Association
Kansas City, Kansas

Dr. Ralph Heal, Executive Secretary of the National Pest Control Association, regrets that he is unable to be here, but this conference conflicts with the meetings of the Entomological Society of America in Montreal, Canada. He asked that I represent the Association and the structural pest control industry on the program this afternoon.

The structural pest control industry had shown considerable growth in the last 18 years. In 1954, there were 3,000 firms. In 1963, there were 5,200 doing a $231 million business. In 1971, there were 9,000 firms doing over $500 million in revenue. Dr. Heal recently said, "As consumers put greater pressure on our food industries for quality products and services, sanitation standards will become more strict, which in turn will result in a continued growth of the pest control industry. No one likes to have cockroaches in the kitchen, rats or mice in the basement, their homes eaten by termites, or to be personally bitten by mosquitoes or ticks."

Problems with containers in the pest control industry are in the following areas:

A. Dispensing small amounts (1-3 oz.) of pesticide concentrates from gallon and 5 gallon containers results in waste and spillage.

Recommendations: Containers with pour spouts, or restrictors. Pre-measured amounts in individual containers.

B. Labeling of service containers. It is frequently necessary for service technicians to place subdivided concentrates or diluted pesticides into service containers for transportation for use on the job, or for temporary storage prior to use. N.P.C.A. Technical Release #15-66 dated June 16, 1966 gives the Association's recommendations. Are these recommendations current and based on the new Federal Environmental Pesticide Control Act, P.L. 92-516?

C. Safe disposal of empty pesticide containers. As early as 1965, N.P.C.A. issued a Technical Release on this subject: N.P.C.A. Technical Release #23-65 dated December 6, 1965. This is a continuing problem. The National Pest Control Association has always attempted to keep the industry aware and informed of its responsibility in the safe disposal of empty containers.

D. Disposal of pesticides and handling to minimize excesses. N.P.C.A. Technical Release #17-71 dated October 29, 1971 covers this problem area based on currently available information. It also reviews the disposal of containers.

Copies of the above mentioned Technical Releases are available and may be obtained from: National Pest Control Association, 250 W. Jersey St., Elizabeth, N.J. 07207.

Thank you for the opportunity to participate in this conference. The National Pest Control Association definitely wants to contribute input into such conferences as this one and to be kept abreast of any changes in regulations and recommendations in this area, so that revised Technical Releases can be disseminated to the pest control industry.

As in any growth industry, there is a continuous need for education and training of new persons coming into the industry.

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY FARMERS

by

Fernand Falgoust, Jr.
Farmer
St. James, Louisiana

First of all, I'm a sugarcane farmer. My farm is situated between New Orleans and Baton Rouge.

Farmers are aware of the dangers of supposedly empty containers. I say supposedly empty, because many containers used do not easily or completely empty. The best example of this is the steel drum which always has a half pint to a quart of liquid remaining in it after it is emptied. There is a definite need for an improvement in this type of container.

Disposal of these drums by large operators is achieved through the sale to reconditioning plants. The small operator does not use enough drums to sell, and mostly uses them for trash burning, which in time disintegrates the container.

There is one suggestion I have which I think should be implemented. All pesticide containers should have some easily identifiable marking designating them as such, and perhaps maybe pesticide containers should bear the same color.

I have also observed that the warning or danger labeling on some containers is inadequate.

While there has been some misuse of containers, farmers as a whole have kept this misuse to a minimum. However, the news media in some groups would have you believe otherwise. For instance, just yesterday evening on a New Orleans TV cast, there was a report of a fish kill north of New Orleans and came up the whole river. In the first report on TV, I heard that it was thought to be due to farm chemicals. Now I don't know *who* *thought*: that the reporter *thought*, the station *thought*, or someone else. About 20 minutes later, a different reporter said he thought it was a spill from a creosote plant in Mississippi. The point I'm trying to make is, farmers are easily blamed, and manufacturers are easily blamed. I have yet to hear a news report state that municiple garbage or sewage caused the fish kill, or perhaps maybe a dump. I am confident that corrections needed can and will be achieved by the industry.

Unrealistic and unworkable regulations as witnessed in parts of the OSHA Act can only hamper technological advances to cure the problem. I make this point because I think part of those regulations are unworkable. I think the legislation is unworkable. Perhaps legislation affecting containers could be unworkable. The point I'm trying to make is that when regulations are made, first they should be necessary, they should be realistic, they should be workable, and they should be economically feasible.

Fernand Falgoust, Jr. is a full time farmer, and grows sugarcane. He is also Vice President of West St. James Farm Bureau, and is on the Board of Directors of the St. James Cooperative Association. He went to business school after high school. He uses both ground and aerial application equipment for pesticides at his farm, where he employs from six to 20 people, depending on season and tasks.

PROBLEMS WITH PESTICIDE CONTAINERS AS SEEN BY DRUM RECONDITIONERS

by

Morris Hershson
National Barrel and Drum Association
Washington, D.C.

Ladies and gentlemen. I am here to discuss the decontamination and disposal of pesticide containers. Now I have heard a great deal of talk here yesterday and today, but really, it is no problem. If some super planner 40 years ago, with prophetic powers, had the ecological foresight to determine that 35 or 40 years hence there would be environmental problems concerning pesticide containers, he would have said, "I will create the steel drum reconditioning industry and they will dispose of that problem." Well, we have a steel drum reconditioning industry, a comprehensive industry throughout the United States and Canada.

This industry collaborated with the National Agricultural Chemicals Association seven year ago in the creation of a manual by the NACA, "The Decontamination and Disposal of Empty Pesticide Containers." It is dated June 1965, so it is not new.

In it we asked that the containers be drained and rinsed, and the manual discussed this method of draining and rinsing. Then let us know and we will buy the containers from you. Instead of having an ecological villain, you have an economic asset, without government subsidy, without government regulation, and without all the red tape involved. All you need to do is to let us know that you have drums (30-gallon and 55-gallon), drained and rinsed, and we will pay you for them. Now, what is the great problem?

This manual, by the way, is out of print; that is why I am showing it to you, because in case you want to get it, you cannot. I spoke to Denis Hayley yesterday and this morning, and he told me that if there are enough requests for it, his Association will reprint the manual and send it to anyone who requests it. Since the creation of the manual, the National Agricultural Chemicals Association has modified the rinsing and draining procedure. They have a new sheet which they will either add to this manual or slip into the proper page, but the rest of the manual is as valid today as it was 7 years ago.

What did the manual state, after the drum was drained and rinsed, with reference to its disposition? I will read you a couple of lines: "The following reconditioning procedure is utilized by many professional drum reconditioners and satisfactorily destroys any pesticide remaining in the container. A list of members of the National Barrel & Drum Association and of other drum reconditioners having suitable burning facilities is attached." And there is an appendix of the names and addresses of all our reconditioners in the United States, as of 1965, who have burning facilities.

And then, in the manual, there are 3 simple requirements: "1. The heads are mechanically removed from tighthead drums. 2. Drums are upended and heated by direct flame in a special drum furnace to 1000 degrees F. for about 10 minutes. 3. After cooling, the drums are shot-blasted to remove all traces of foreign matter both inside and outside the drum." That procedure was in existence then and is in existence today.

So you have no problems with the disposition of 30 and 55 gallon pesticide drums, all other conversations between yesterday and today to the contrary not withstanding. Because we are ready, willing, and able, to purchase these drums in suitable quantities and in proper condition, drained and rinsed.

Draining is an extremely important part of this process. I understand from Denis Hayley that tomorrow he will discuss with you the new draining and rinsing recommendation of the National Agricultural Chemicals Association. From my understanding of the recommendation, having spoken to him today, it is a simplified and vastly improved procedure which will answer most of your questions.

The Chairman of our Technical Committee, Frank Langella, spoke to me before I left and suggested the following. (He is technically much smarter than I will ever be.) He is not a chemist, but he recommends to the chemicals industry and to the pesticide industry the following: Why not do a little research and development on something which may take the place of rinsing and draining in those areas where draining and rinsing are not practicable? For example, suppose you create a material similar in density to a sweeping compound, peat moss, or what have you, and impregnate this material with some chemical which neutralizes a pesticide. Dump a couple of pounds of this material into a drum where draining and rinsing is not practicable and leave it there and move it around. When we get that drum, dehead it and burn it, we consume these products; there is nothing left on the site of the emptier or on our site. If this can be done, it might be a very, very useful alternative.

I would also like to make some comment on what I have heard here yesterday. There were some rather inconsiderate and unnecessary attacks on the reconditioned steel drum, if I may say so. The statement was made that, when our drums are "incinerated," (I do not know where the gentleman got the word) that "to incinerate is to consume." We do not consume drums; we burn the residue, we burn the interior and exterior foreign matter; we do not "incinerate" the drum itself. (I wonder whether the gentleman orders "incinerated" steaks or "incinerated" eggs and bacon?) We pass the drum through a burning process. This has been done by us for 30 years, and during the past 30 years, gentlemen, the steel drum reconditioning industry has reconditioned literally hundreds of millions of open-head drums through the burning process and the shot-blasting process. And we have supplied these drums to the major drum filling industries in this country: petroleum, chemicals, petrochemicals, adhesives, you name it. According to yesterday's spokesman for the new drum industry, all of these companies did not know what they were buying, and they were buying a "pig in a poke." For 30 years we have been supplying these drums and their integrity has not been impeached by our customers. So when you want to know the value of a reconditioned steel drum, do not listen to the spokesman for the new drum industry, and do not listen to the spokesman for the reconditioned drum industry; ask the people who use the reconditioned drum whether it is a good drum or not, and whether the integrity of that drum is as sound as it should be.

This spokesman has also made a comment that a pesticide drum should be recycled by sending it to the scrapyards, not reconditioning it. "That is the ideal," said the spokesman for the new drums, but he added in a quick aside "they would first have to be decontaminated." Well, if they are first decontaminated, why do you have to send them to a scrapyard? We will buy them at a much greater price than you will get from the scrapyard (if you will get anything from the scrapyard.) I would like to see the scrap dealer in this country today who will call for a truck load of pesticide-contaminated steel drums if you will give him the drums for nothing. So this suggestion that the drums should be recycled and not reused comes with ill grace from an industry which is supposed to be cooperating with the environmental authorities and the conservation of natural resources and in the reuse, as much as possible, of all our containers, if it is possible to reuse them. He was also attacking the possible reuse of steel drums for pesticides; he is shadow boxing, because we made no such suggestion. We do not advocate the reuse of steel drums for pesticides, and the regulations forbid it. The regulations of the DOT do not permit the reuse of DOT 17 series steel drums for other than 4 categories: flammable liquids, flammable solids, oxidizing material and radioactive materials. Corrosive materials and poisons cannot be shipped in reconditioned containers. So I do not know who he is opposing in this statement of his.

We are having no problems getting drums from commercial applicators. We are having no problems getting drums from industrial emptiers. Whenever they are empty, drained, and rinsed, we buy them. Now there must be some problem in obtaining drums from farmers who may have 1, 2 or 5 drums. Obviously no reconditioner will send a truck, at the present teamster rate, a distance of X miles to a farm to pick up 5 drums. If you remember the slides yesterday concerning the farm survey, you will recall that in answer to the question whether the farmer would deliver his empty pesticide containers to a central collection point, the answers were 50/50 "yes" and "no," approximately. But that question did not have within it, I am certain, "Would you deliver your empty pesticide containers (30 and 55 gallon) to a central collection point if, when you arrived there, you would be paid at that point for the drums?" I am sure that a much greater percentage than 50% would then say, "Yes." And under those circumstances, we would then get a large majority of the farmers' drums at a central point where it would be economically feasible to have these drums picked up by the nearest drum reconditioner who has a burner.

I reiterate, there is no problem, not with reference to 30 gallon and 55 gallon steel drums. What problems you have with paper, 5 gallon drums, 5 gallon pails, and what have you, I am not prepared to discuss. But if I have a few more moments, I would like to hear a question or two on this subject from anybody in the audience, since I know I have been bombarded with questions outside.

Thank you.

Morris Hershson has been President of the National Barrel and Drum Association for 27 years. He is a graduate of the Law School of St. Lawrence University, Brooklyn, N.Y. and was a practicing attorney in New York City. He was Chief Counsel of the Steel Division of the U.S.Office of Price Administration in Washington during World War II. He is active on the Drum Committee of the Petroleum Packaging Committee, the National Paint and Coatings Association and cooperates with the Packaging Committee of the Manufacturing Chemists Association, as well as being a member of the Water Pollution Control Federation.

PROBLEMS WITH PESTICIDE CONTAINERS
AS SEEN BY LANDFILL OPERATORS

by

Dirk R. Brunner
Solid Waste Research Laboratory
Cincinnati, Ohio

The comments of our previous speaker indicate there shouldn't be any 30-gallon or 55-gallon containers to dispose of at a landfill. I believe, if you look carefully at the existing local and regional markets, you will not be able to achieve 100 percent reclamation of all pesticide containers. Those containers considered to be non-recyclable (damaged cans, etc.) must be safely disposed of. Several recent research studies indicate incineration can be used to detoxify pesticide residues, thereby allowing those containers not recycled to the pesticide market to be reclaimed as scrap metal or disposed of safely. The secondary materials market is highly variable, at times creating a situation more conducive to disposal than transport and reclamation. Pesticides are also distributed in containers other than 30- or 55-gallon metal drums.

Presently there are two basic methods for disposing of solid waste, and I am including pesticide containers as solid waste: incineration and sanitary landfilling. I'll limit my subsequent comments to sanitary landfilling because I am not competent to critically evaluate incineration of pesticides and their containers.

Sanitary landfilling is a bit more than the dump that probably serves your hometown. In fact, the 1968 a national survey indicated 6 percent of the nation's solid waste disposed on the land was by sanitary landfilling. This figure was based on very rough criteria, even excluding an investigation of ground water impairment. The number of acceptable disposal sites would even be lower if more stringent criteria were used. This severe shortage of suitable solid waste disposal sites indicates there are few acceptable sites for disposal of pesticides and pesticide containers.

California, a leader in landfill technology, can be used as an example of the shortage of acceptable sites. There are presently only 11 Class 1 disposal sites that accept all types of pesticides and containers. For the less hazardous pesticides, the more prevalent Class 2 disposal sites can be used. EPA's position stated in a brief paragraph in *Sanitary Landfill Design and Operation* published this year, allows the disposal of empty pesticide containers at all sanitary landfills. If we look at the California guidelines for pesticide container disposal, empty containers can only be disposed if they are rinsed. More work is definitely needed in this area before the establishment of sound guidelines.

What are some of the problems that the landfill operator has? Basically, they revolve around the health and safety of the employees. What type of employees do we have? We have poorly educated people who are working on the collection route and at the disposal site itself. The specific jobs performed by disposal site employees are equipment operators and spotters. The equipment operator, located several feet above the solid waste, spreads and compacts the solid waste (including pesticide containers and other hazardous wastes) 8 hours a day. In other words, these people endure long-term exposure to a variety of hazardous materials.

The spotter is responsible for directing collection vehicles to the appropriate areas for waste deposition and subsequent spreading and compacting. Typically, the spotter stands in or adjacent to the waste through most of the day. He consequently is exposed to the dusts, aerosols, splashings, and occasional explosions associated with the waste deposition.

These two employees at the landfill site are the ones who are exposed the most to pesticides in the solid waste disposal field. They are the potential victims of the pesticide problem and the hazards associated with it: the irritants, the breathing of toxic chemicals, and so forth.

How can we approach these people and solve their problem? We can provide a public education program, directed through their trade organizations. We can do it at the federal level in programs. We have, in the past, directed training programs at the public administrator, the engineer, and the public. We are now directing our training efforts to all the operating people, the ones who are intimately involved. Basically, we've got the same problem the trucking industry has, or any one of the transportation industries that are only partly affected by the pesticide program. That is, many of the employees are not aware of the problems and they do not know how to handle the pesticides. They don't really know how dangerous they can be or whether or not all of them are dangerous.

This is the type of information that I feel should be labeled on the container when it's brought to the landfill. We must remember that people are at the disposal site. We have to consider the durability of that container all the way through the system, and specifically the label. Without notifying these people about how to dispose of a pesticide and the problems associated with it, we are exposing them to potential accidents and explosions. There have been explosions due to the carrier liquid in the pesticide; when this occurs at a sanitary landfill, both life and equipment are endangered. The bulldozer is a minimum of $50,000 investment for the landfill operator; you can't put a dollar value on the operator's life or health.

We can also have inhalation of dusts. There was one example following a warehouse fire. Several thousand pounds of damaged packages containing pesticide dust were to be disposed of. The containers were brought to a landfill site; a dozer was run around to cover them over with soil. The whole time the dozer operator was working, he was breathing in the pesticide dust. How did this affect him? We don't know. There was no investigation of this particular incident in terms of health and welfare of the dozer operator.

So we've got these problems with pesticide containers, and how to get rid of them in a landfill. If it is truly a sanitary landfill, the ground water and surface water contamination problems are minimal. But there aren't too many sanitary landfills around. The problem then revolves around what happens to the employees who are disposing of these containers as well as other hazardous wastes at the landfill site.

Dirk R. Brunner is Project Manager of the Land Disposal Project, Solid Waste Research Laboratory, U. S. Environmental Protection Agency, Cincinnati, Ohio. He graduated from Clarkson College, Potsdam, New York, with a major in civil engineering, and did graduate work at the University of Maine in sanitary engineering. He joined the U. S. Public Health Service, Solid Waste Program in 1968, and this work became part of EPA's responsibility in 1970.

EXCERPTS OF DISCUSSION CONCERNING EMERGENCY ASSISTANCE AVAILABLE FOLLOWING CHEMICAL SPILLS

Around-the-Clock Emergency Telephone numbers:

(800) 424-9300	Chemtrec (Manufacturing Chemists Association Sponsor)
(202) 426-1830	Coast Guard (Tied in with Department of Transportation)
(513) 961-4300	National Safety Team Network (NACA sponsored)

Denis Hayley, National Agricultural Chemicals Assn.

Some time ago, March 1970 to be exact, the Association put into effect what we call the Pesticide Safety Team Network. This was set up as a voluntary effort on the part of the industry to try to correct some of the practical aspects of accident decontamination. Now, two gentlemen that immediately preceded me, representing the truck industry people and the tank truck shippers association, have said that the industry should do something about this matter of decontamination and disposal of accident materials. Our Safety Team Network, since its inception in March of 1970, has answered 247 reports of incidents. Of that number, 113 of them have taken place this year, requiring the services of 18 safety teams on the site.

Now, in order to put this into perspective, there are 2 telephone numbers that can be used. One is the Chemtrec service sponsored by the Manufacturing Chemists Association: (800) 424-9300, a 24 hour-manned information center. If a pesticide is involved in the accident that is reported to that number, they will immediately call the Safety Team Network number which is (513) 961-4300. Again this is a 24 hour number. The network is what Mr. Burns called the "Go-Team." The message will immediately be transferred to one of our area coordinators who in turn will call back to the person reporting the incident and take over from there. If a Safety Team is necessary on the job, it will go. Information on the Network is readily available, and it has been since March of 1970.

Clifford Harvison, National Tank Truck Carriers, Inc.

Sir, again, I'm glad to hear it; I wish I'd heard it before, and I'm sure our carriers do. You've done something, this whole thing we were talking about: the problems of communication. I represent a national trade association. We have members operating throughout the 48 continental United States and in 11 foreign countries. I did not particularly know about the National Safety Team Network. We certainly know the Chemtrec number however. With all due respect to the Manufacturing Chemists Association, they have publicized that as being helpful in incidents where there are chemicals.

Part of our problem, and I obviously did not cover it thoroughly enough, is that many of the bills of lading that we're shipping now don't even contain the word pesticide. It is just the "8-6-0" or the "Tri-whatever-have-you." In the particular reservoir incident in the northeast that I spoke of, the first 3 hours of the 4 hour "scenario," if you will, were just finding out the nature of the product. Of course, you know when they found out it was a pesticide, they went "bananas." You're right: the last hour was taken care of quite expeditiously after finding out exactly what the product was.

National Tank Truck Carriers, Inc. publicizes what we call a Mutual Aid Information Booklet. This is a booklet that is sent to all of our carriers. It contains the 24-hour phone numbers of all our member companies, the home phone numbers of our safety directors, Chemtrec's, Allied Chemical's, DuPont's, etc.

If you and I can get together maybe during the break, I'd be more than happy to exchange cards. I can assure you that the particular service that you offer will be adequately publicized to our carriers.

Unidentified man from the audience:

I am a member of the Manufacturing Chemists Association, although I don't speak for them. I'd like to emphasize the fact that Chemtrec is available for any incident involving a chemical, be it a pesticide or of any other chemical nature.

Mr. Lewis, Central Freight Lines, Inc.

I want to compliment the Agchemical industry for the very thing that he made reference to because we have used this with great success and to a great extent when we have a chemical spill. Believe me, when you call these folks you get response, at no expense to you. They foot the bill and they've done a heck of a good job. I'm sorry there was a misunderstanding and I hope this clears it up, because we're greatful to them and I think they're doing a tremendous job.

Willis F. Mitchell, Department of Transportation:

I just wanted to clear up one question that was brought up, "Why call the Coast Guard?" Well, for your information, the Coast Guard is an agency of the Department of Transportation. The DOT Hazardous Material Regulations require an immediate report on certain hazardous materials incidents that occur during the course of transportation (including loading, unloading, and temporary storage). The Coast Guard operates the DOT Emergency Telephone System. The number for the Coast Guard is (202) 426-1830.

CONCLUDING REMARKS OF THE MODERATOR

by

Emil Mrak
Chancellor Emeritus
University of California at Davis
Davis, California

First of all I want to thank the speakers. The difference of opinion I think was great; this certainly brought things out:

1. With respect to the whole meeting, I can't but wonder sometime if we might be trying to outlaw Murphy's law. Murphy's law, in case you don't know, says that if a thing can happen, it will happen.
2. It looks to be as though industry needs to congeal and let its problems and thoughts be known to each other and also to the government. That's happening here.
3. Government agencies need to work with other agencies in the government and with industry, and that's happening here. I hope more of it comes about.
4. A general observation: it seems to me there's an increase in concentration of power in Washington.
5. There is a need for good and considered judgment.
6. There is a need for communication between government and industry, between government and government, and between industry and industry.
7. There is a need for education and understanding between government workers, between industry workers and the public. The fact is that the whole mish-mash we reviewed this morning showed need for education and understanding in all areas.
8. Apparently there is a great need for information on shipment, and this may be a matter of communication.
9. There still seems to be some concern about labeling. I've heard this ever since I've been around Washington. I don't know what you can do about it but something needs to be done.

10. The Farmer present made a very pertinent suggestion with respect to legislation and regulations. They should be workable. Maybe he needs to get this to the Congress.

11. There is some need for research.

12. Finally, I would give my congratulations to Bill Wymer, Dr. Preston and Ruth West for bringing about this conference. I think it's a great conference.

Emil Mrak, Chancellor Emeritus at the University of California at Davis, also received all of his academic training from this institution. Dr. Mrak has held many nationally important posts and prepared many important technical reports over the years; a few posts include Chairman of Secretary Finch's (DHEW) Commission of Pesticide-Related Health Problems, Chairman of the Assembly of Scientific and Technical Advisory Council, co-founder of the publication Advances in Food Research, and has served on the Agricultural Board of the National Research Council.

SECTION VII

INNOVATIONS AND PRACTICES TO MAKE CONTAINERS SAFER AND BETTER

Some tested and new ideas for making, supplementing, transporting, emptying, disposing, and reusing pesticide containers

PLASTIC-COATED GLASS CONTAINERS

by

H. F. Zink
Owens-Illinois
Toledo, Ohio

I would like to share with you today an understanding of the major thrusts of programs underway in the glass industry directed toward the improvement of performance of glass containers. They are presented at this meeting since they can specifically apply to the improvements of glass as a container material for pesticides.

I appreciate very much the opportunity to talk on this exciting and promising field, and I can assure you that there are very significant and extensive developments underway. In a few minutes today, I would like to review with you what has been done, what is available in achieving our goals, and what we see in the future.

To provide some background for understanding, let's first examine the characteristics of the material GLASS that we are working with so that we can understand how these characteristics may be used to aid us in achieving our goal of improved performance.

Other speakers today have brought out the characteristics of glass that make it so useful as a packaging material. These are the characteristics of corrosion resistance, impermeability, recyclability, transparency and temperature resistance -- all of which would make glass a very difficult material to replace on the marketplace. However, without minimizing the value of these advantages mentioned, I will not dwell further on them today.

Instead, I would like to review with you the potentials of overcoming a remaining challenge that would make glass a perfect package. That is, what are the characteristics of glass that can be used to improve its resistance to breakage?

In the following discussions, I would ask you to remember that glass itself is an extremely strong material when stressed in compression, and it essentially does not fail in compression.

Second, under certain conditions when the glass surface is pristine as in the newly formed condition, a glass article is quite strong.

Third, practically speaking, protection or manipulation of the glass surface improves effective performance of the glass container.

Considering these characteristics, you may see that the key to improved performance would be the protection of the surface and/or the manipulation of compressive forces in a manner similar to that used in the construction industry with prestressed beams.

Remembering these principles then, let's examine how they can be put to practical use. Perhaps the simplest approach is to take advantage of the fact that if the surface of glass can be protected, we can utilize the previously mentioned initial pristine strength.

This can be done and is being done very extensively through the use of protective coatings; that is, thin organic coatings placed on the container that provide a high degree of lubricity and resistance to abrasion through contact. Such coatings are in extensive commercial use today, and significant improvements of container performance are realized by their use.

These coatings are permanent in that they cannot be washed off, very thin and invisible. They are usually formed by the application of a metal oxide coating to a very hot container, followed by an application of a thin organic coating such as polyethylene wax applied at lower temperatures.

While the protective coatings offer resistance to normal abuse encountered in filling and handling applications, it is desirable to provide protection against gross abuse. These more stringent requirements have led to development of a system of coatings for glass containers that have other functions than the ability to provide resistance against abrasion.

An example of such a coating system is that used commercially on glass containers for use of aerosol propelled liquids. These coatings are quite thick in nature. They offer an almost unlimited degree of protection against abrasion, a significant degree of resistance against impact - in smaller sizes particularly - and even a retention of glass fragments if the container is subjected to a degree of abuse that causes its rupture. These containers have been on the market for many years. They are relatively expensive...they are attractive...and they effectively serve their purpose.

Still another example of a container coating with more than one function is that of the Plasti-Shield® container with its foam protective wrapping now marketed particularly in soft drink and beer applications. This coating also offers a very high degree of protection against scratching or abrasion superior to that of thinner films. It further offers a modest degree of protection against abuse. It is also obvious that it offers significant marketing advantages of labelability and appearance.

It is important to recognize that this improvement is also in widespread commercial use.

In addition to the available and useful coatings that we have described, there is a good deal of activity at the present time in the industry devoted toward the search for and application of coatings for glass containers that possess higher strengths.

The thickness, the cost, the appearance of the final package would vary depending upon the degree of performance required and the other aspects such as visibility of contents, ecological considerations and application capability.

Some of these coatings are in limited use and in a state of active development. The most stringent requirement is that of retaining liquid contents by organic coatings on glass in all sizes of containers under all considerations of abuse within practical cost considerations. This requirement offers the greatest challenge. Complete retention of liquid requires very strong materials because of the energy involved in unreasonable abuse situations.

Practically, this objective means that careful consideration must be given to the specification of protection required, balanced against the material characteristics, practical consideration of economics, and ability to supply these coatings in reasonable quantities.

We do not yet know of a coating system that will consistently satisfy all desired requirements. I do not imply that these things are not possible. Indeed, technology in this particular field is rapidly advancing in areas of available materials and available application processes -- such as electrostatic powder coating or other highly efficient means of application of materials.

This point is apparent from the recent introduction of systems such as the Plasti-Shield Container system which would not have been possible a few years ago from the standpoint of materials and economics.

Before I leave the subject, I would like to point out another approach to improved performance of glass. That is the possibilities of the improvement of the performance of glass container strength through the application of the previous mentioned characteristics of glass that have to do with its high compressive strength and its sensitivity to surface manipulation.

Without going into a great deal of technical detail, it is possible to manipulate glass articles in such a manner that the exterior and interior surfaces of the article are placed in compression, while the interior of the glass remains in tension. Under this condition, to cause a breakage of the container under an imposed load or stress, it is necessary to first overcome the compressive stress applied.

This situation is familiar to most of us when we consider tempered glass doors or windows, or windshields in flat glass articles. These articles are commercial realities. In the case of the glass container, the situation is much more complex since we are not dealing with straight, simple shapes and techniques of manufacture are much more involved.

There are really two ways of achieving such a tempered article. First, through the simple thermal tempering process. In this case a glass article, when in a very hot and semi-plastic condition, is subjected to fast chilling from both sides. The skin or surface can be effectively frozen and rendered non-plastic. With further cooling, the entire article contracts or shrinks, with the interior capable of moving and the exterior fixed or rigid. This actually causes the skins of the article to be placed in compression.

Our company and many others have expended considerable effort in the exploration of the application of this system to glass containers. While our technology is moving, we are not yet able to control this process to the degree necessary.

A second application of tempering, however, is in the chemical change of the skin of the article. In this system, again while hot, the surfaces of glass are chemically changed to place the exterior skin in compression. Apparently, when there is an exchange of larger alkaline metal ions for smaller alkali metal ions in the glass, the glass surface is placed in compression because of the larger ions being forced into smaller spaces previously occupied by the smaller alkali metal ions. Treatment is done at a temperature low enough that the glass cannot readjust in order to relieve the compressive stress.

Chemical tempering of glass containers is not yet commercial, but there is hope and a degree of probability that significant strengthening of glass containers can be achieved. We would expect that within the next few years advances will be made in this field. The challenge here will be to attain significant strengthening at practical cost. The importance of this activity is that it is an indication of the dedicated effort for the improvement of already extremely useful material.

All in all, and in review, there are possibilities of improving the effective strength and performance of glass containers. Some of these possibilities are real and are here today.

Work is going on in the improvement of these coating systems and the improvement of the inherent effective strength of glass itself. We are encouraged. The industry is working on these opportunities and it is our sincere hope that this work will increase the usefulness of glass as a perfect container material for the pesticides, which is the subject of our discussion.

H. F. Zink is Manager of Product Research and Engineering, Glass Containers Division, of Owens-Illinois in Toledo, Ohio. He is a graduate chemical engineer, and has worked with Owens-Illinois in various capacities in production and engineering. His present responsibilities include improvement in glass container performance in areas of surface treatment and coatings, strength improvements, annealing, solid waste disposal, and decorating.

PLASTIC FOR WATER-SOLUBLE CONTAINERS

by

Kim Coppage
Mono-Sol, Division of Chris Craft
Gary, Indiana

Good morning gentlemen, I have been asked to talk this morning about water-soluble plastics. I think I'm going to be a little more specific and talk about water-soluble polyvinyl alcohol plastic. PVA has been used industrially for many years; it's not anything new. I think the resin was discovered back in the 30's. They were making industrial grade films in the late 40's. In the mid 50's we discovered how to make cold water-soluble polyvinyl alcohol film. I think generally Mr. Ed Kratz who founded our company has been given a great deal of the credit for developing the plasticizer system which allows us to make film from this partially hydrolyzed resin.

You're probably most familiar with it in laundry products, certain bleaches, dyes, some germicidal detergents, and now even the agricultural chemical industry is beginning to be interested in this type of film. I'm not going to be silly enough to stand up here and say that this is the answer to your disposal problems that I have been hearing about for 2 days, but I agree with Mr. Frommer when he said that possibly this might be part of the answer.

I think it really created a great deal of excitement because it is the perfect concept, that is, a container that disappears as the product is being used. I find that kind of exciting. It would solve your disposal problems for a great many wettable powders, water-soluble powders, as well as some liquids.

There are some other benefits, however; not only does the container disappear as you're using the product but I think normally you would get better control of dosage. Let's say, for example, an applicator in the field has a 25 lb. bag of wettable powder and he needs only 8 lbs. I think that we all agree that probably the best way that he's going to do that is just guess. And I think he could probably be off 2 to 3 lbs. either way.

I think, thirdly, that a very important aspect is the fact that it eliminates the hazard for the applicator. It eliminates the dust problem and a possibility of the operator being injured with the hazardous material. This, I think, is going to be gaining importance in OSHA.

As to physical properties, this is a plastic film. It has great tensile strength, about 7,000 psi; tear resistance is about 550 grams per mil; and it has about 300% elongation under normal conditions. It's quite flexible. It is an opaque film except on contact; that is, if you hold it up you can't see through it, but if you lay it down on a piece of newspaper, you'll be able to read through it. It is resistant to most solvents, such as toluene, xylene and kerosine, and it's resistant to ultra violet. It is available now commercially in mil-and-a-half, 2 mil, and 3 mil gauges, and in widths from 1 to 54 inches.

There have been some misconceptions about this type of material. It does have an indefinite shelf life. In other words, if we laid it on the table, the water vapor in the air would not make that film disappear. It takes water in liquid state to put it into solution. Because water is part of the plasticizer system, it does react differently in different atmospheres. If it is very hot and very humid, the film will become stretchy like a rubber band. On the other hand, if it's very cold and very dry, it will tend to get a little rattly. When you are running this film on equipment, you would, I'm sure, want to take that into consideration.

It is completely soluble in water. The length of time to put this into solution varies with the amount of agitation and the temperature of the water. The warmer the water, the quicker it will go into solution. The more agitation it has, the quicker it will go into solution. We test it by putting 3,500 cc of water in a beaker. A 2-inch square of film is placed on top, and the H_2O is gently stirred. When the film breaks up, we turn on the magnetic stirrer and observe until there are no more particles left. The water is then run through a 200 mesh screen to check for residues.

To give you an idea of the water temperature and solubility, at 38° F the film breaks up under the method I just described in 31 seconds and it completely dissolves in 55 seconds. At 70° it breaks up in 15 to 20 seconds and is completely gone in 40 seconds. In 100° water, it breaks up in 10 seconds and is completely gone in 25 seconds. Now, that is only the film. That's not film with compound in it, which brings us to another point.

There are some products that are incompatible with PVA film. Basically the halogen family, high amounts of free chlorine, bromide, quaternary ammoniums, and phenolics can insolubilize the film. However, Colgate is packaging a chlorine bleach, and they are having no problems. So, some of these materials can be used.

What I guess I'm really saying is, before you go into a program, you should test the compatibility of your product with PVA. That can be done in 2 ways. You can send your product to us and we'll put it under accelerated heat and aging conditions, and we'll age it in varying humidities to determine if there is any problem. Or, if you prefer, and if your material is extremely hazardous or if it is experimental and you don't have all the toxicology data, we'll send the film to you along with the test methods so that you can do your own compatibility testing. We test only the effect of your product on our film. You are going to have to test for the effect of our film on your product. If it reacts with your technical material and renders it inactive, well, for that we have no facility for testing.

As far as actually putting the product in this film, PVA film, like most unsupported plastic films, doesn't lend itself to bag filling operations. That is, I don't think it's a good idea to make the bags and then try to bring them into your plant and fill them with your existing equipment. Basically what is needed are form-fill-and-seal machines. These take the film as a sheet on a roll, take your product, and form the two into a bag. There are some contract packagers available who can do this and, of course, there are a number of machines that can handle PVA. I'm going to list just some of them so that you can get an idea. If I leave out any and there's a machinery man here, I'm sorry. I have seen our material run on the Cloud Machine, Bartell, Hercules, Circle Design, Production Packaging or Protopack machine, Hamack-Hensella, Rovema, and Triangle form-fill-and-seal machines.

So it is applicable, it's vital and I think an exciting alternative to disposing of containers in a conventional way. Just since I've been here, I've been looking around and I've seen some other applications for PVA, and I'm sure you will too, such as drum liners or something of this nature.

Kim Coppage is Sales Manager of Mono-Sol, Division of Chris Craft, Gary, Indiana, a position he has held for the past five years. He graduated from Northwestern University in Evanston, Illinois in business administration with a major in marketing. His previous experience before Mono-Sol was in the pharmaceutical industry.

WATER-SOLUBLE CONTAINERS FOR PESTICIDE USE

by

Richard A. Broom
Niagara Chemical Division, FMC Corporation
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Today, I have the privilege to talk about one of the exciting projects we have under way which we think is a significant contribution toward the safe handling and using of pesticides and toward a better environment. The project I speak of is our water-soluble packaging system for pesticides.

The use of water-soluble materials in packaging is not new. Foods packaged in water-soluble packages and drugs encapsulated in soluble materials have been available to the public for some time. Certain soaps, detergents and bleaches are packed in water-soluble film. Many hospitals are using water-soluble laundry bags made from polyvinyl alcohol resins to minimize employee exposure to contaminated clothing and bed linen. The whole bag of laundry, package and all, is tossed into the washer. Polyvinyl alcohol, better known as PVA, is used as a sizing material in textile industry as a substitute for starch. This is probably the largest single use for polyvinyl alcohol resin in the United States today. PVA resins are also used in leather finishing, and in envelope and postage stamp adhesives.

United States producers of PVA were predicting large markets for their product in the sixties. Growth was expected in many applications such as detergent packages and hospital laundry bags, but the huge markets did not materialize. United States consumers were not willing to pay the premium for water-soluble packaging. However, PVA did take off in Japan in the sixties, where production capacity now stands at 526 million pounds. Their big markets are one-way food containers and hospital laundry bags. On the other hand, United States production stands at 65 million pounds, but there are indications that the PVA market will expand rapidly in this decade.

When we were asked to talk about Niagara's water-soluble packaging system for pesticides, I explained to your program chairman that much of the development work we have done with water-soluble film is of a proprietary nature, and therefore, my comments would be somewhat limited. Niagara has several objectives in mind for the development of a water-soluble packaging system for pesticides.

1. Package disposal:

   One of the more important features is the elimination of the necessity for burning or burying a contaminated package. The soluble bag becomes a part of the spray solution and is sprayed on the crop, leaving the overwrap uncontaminated.

2. The soluble bag eliminates user exposure when loading the spray tank:

   The applicator can fill his sprayer without coming into contact with the insecticide, getting dust on his hands, or possibly inhaling powdered materials.

3. The soluble bag acts as a precision measuring device:

   The small water-soluble packs eliminate the need for using partial packages which require the use of scoops, scales or other measuring devices to be sure that the proper amount of pesticide is put into the spray mixture. The bag is a convenience to the applicator and certainly mitigates the possibility of over-dosing plants and exceeding tolerances due to inaccuracies in weighing.

4. Cost saving to the user:

   The soluble bag eliminates the possibility of material blowing away in the mixing operations. Many of the new pesticide chemicals cost $5 or more per pound. The user cannot afford wasting the product, and of course he does not want to short-change the target insect.

5. Such a packaging system will improve handling practices in our own production plants:

   The bags can be made, filled, and sealed in a single automatic operation that does away with some of the steps in which operators are exposed to the material. This packaging system requires the use of a facility having higher standards for cleanliness and temperature/humidity control than conventional packing operations, which results in better working conditions for our employees.

6. Production Efficiency:

   PVA Film is much more expensive than conventional packaging materials, but we are confident that efficiencies in production and customer demand for this type of a package will more than off-set increased cost. We are in the business to make a profit and hope to find profit opportunities in this project. We agree with one of Secretary Earl Butz's favorite statements, that "PROFIT is not a four letter word."

7. It's also a challenge to do something new and positive about pesticide safety and container disposal problems. We will not complain if we get some favorable publicity as a result of our development work with this project.

In our research and development work, we have found that not all wettable powder pesticides are compatible with PVA film. Several of the products we would like to package in these bags, for reasons of high toxicity, high cost per pound, low usage rate or skin irritation, are not compatible with the film. With some chemicals or formulations, we get answers on compatibility in a very short period of time. The bag may break down rapidly or dissolve. With most chemicals, however, determining compatibility involves time-consuming shelf-life studies under varying conditions of temperature and humidity. We have found that different formulations of wettable powders must be studied, because certain inerts as well as the active ingredient may interact with the film, either lowering the active ingredient or making the film insoluble in water. We are doing additional research to overcome these problems.

Experiments have been run to make sure the film does not affect the biological activity of the pesticide packed in the bag or other pesticides which may be used in the same spray mixture. We have run extensive biological tests in both our Research and Development laboratories and in field trials to make sure of our ground on this point.

In 1970, we test marketed Thiodan 50 Wettable Powder in soluble bags in 14 states. Thiodan was chosen because it has registrations for the control of over 30 pests on 30 crops, which gave us an opportunity to test-market in all sections of the country and under a variety of conditions. We also used the bags to pack FURADAN 75 Wettable Powder in 1970 for our Experimental Use Permit program on potatoes. The purpose of this test-marketing program was to:

1. Determine applicator acceptance.

2. Determine problems of shipping, storage and handling over a wide area.

3. Test the performance of soluble bags in different kinds of sprayers and water.

4. Confirm or deny the results of our experimental work for biological activity, compatibility, phytotoxicity, etc. on as many crops as possible and in combination with a maximum number of pesticide formulations.

5. Solicit comments and suggestions from our customers and marketing people to determine any weaknesses in our packaging system and marketing strategy.

We expanded our soluble bag marketing program in 1971, still limiting our efforts to one product, Thiodan 50 Wettable Powder. At the same time, we were testing various types of master containers and over-packs, and continued experimental work with other products and formulations. This past season, we packaged nine products in soluble bags, moving a substantial volume of product.

Grower acceptance of this packaging system for pesticides has been excellent. The typical comment we get from our customers is, "I wish I could purchase all my pesticides in water-soluble bags." To be sure, we have had a few complaints of nozzle clogging and an occasional comment on excessive foaming, but these incidents were no more prevalent than those which we get from applicators using pesticides from conventional packaging. We expected some problems with the applicator handling soluble bags with wet hands or placing the bags on top of a wet sprayer during loading operations. We printed special handling directions for using the bags in bold print on the carton. Apparently, our customers did a good job of reading the label and following directions, because we had few reports of mishandling. Our marketing experience, to date, in various parts of the country and Canada indicate that there are no geographic limitations and that we should move forward with the water-soluble package as rapidly as possible.

We are confident that the use of water-soluble film for packaging pesticides will increase rapidly throughout our industry provided we are not stymied by government regulations and red tape. Present and proposed government regulations make it difficult to introduce a new packaging system. For example, rules and regulations for labeling have been established for conventional packaging and provide little flexibility for innovations. Although we have been able to convince EPA that there is no necessity for complete labeling of the soluble bag, we think the amount of printing required is still excessive. We see the bag as a safe measuring device within a fully labeled overpack. The bag is not for sale as a unit. Only the fully labeled overpack, with the bags sealed inside, is a product of commerce. We recognize that the contents of the soluble bags should be identified as to product for the convenience of the user, and that a signal warning statement is appropriate. But we feel the additional information which we are required to print on the package serves no useful purpose.

Of special concern to us are the proposed safety packaging regulations which state that toxic wettable powder pesticides packed in five pound containers or less must be childproof. Two of our principal objectives for introducing the soluble bag packaging system for the more toxic wettable powders are to minimize hazards to the operator and to eliminate contaminated container disposal problems. We look at the system as a great step forward in safety packaging and hope that those proposing regulations for safety packaging concur with our thinking. Technically we can circumvent the five pound restriction by packing six one-pound packages in an overpack, provided the one pound package does not have to be childproof. But if the one-pound package is considered to be the package which must be childproof, much of the time, effort and money we have invested in this project will have gone down the drain.

We have been encouraged by several people in EPA to develop this packaging system for all our wettable powder pesticides, especially for the more toxic compounds. We urgently need active support from EPA on this issue.

Commercial users of pesticides are more knowledgeable in the safe handling and use of pesticides than home owners, and storage facilities are usually in protected areas away from the home or garage. In this instance, children are as likely to tamper with larger packages of pesticides as they are with five pound bags or jugs of material if they are available to them. We think childproof packaging restrictions should not be applicable to pesticides packaged and labeled for the commercial user. The childproof package for commercial users should be the pesticide storage shed with a lock on the door. We have submitted written testimony in support of our views to the Hearing Officer in charge of the proposed regulations. If the Safety Panel of the Federal Working Group on Pest Management agrees with our position on this issue, they should speak out in our support. The Safety Panel can certainly render more influence on proposed regulations than we can as an individual company. If you are serious about wanting our industry to be innovators in packaging and handling techniques for pesticides, then you must help us cut government red tape and allow us to move forward.

Water-soluble packaging of pesticides has been tried in Europe and Australia, but with little commercial success. While this could happen in North America, we do believe that we have learned enough about how to produce, package, store, and handle water-soluble packages to expand our marketing program to several additional products in 1973, and increase the volume two to three fold. Our Canadian Division has made major contributions to our research and development work on this project, and have far more marketing experience with soluble bags than we have had in the States.

We are confident that water-soluble packaging for pesticides has a great future. Our customers say, "I wish I could purchase all of my pesticides in water-soluble packages." We also feel pressure from government sources to package all wettable powder formulations in water-soluble film. We do not know that this is impossible. Tests prove that the use of this packaging system can be expanded to many more wettable powder products and thus make a major contribution toward solving problems associated with user safety and container disposal.

We have the technology to send man on an expedition to the moon: unbelievable, isn't it? Who knowns how far and how fast we can go in solving the problems of pesticide packaging? We have placed a high priority on developing the use of water-soluble film. The success of this venture and other innovations in pesticide packaging will be highly dependent upon close communications and cooperation between government and industry.

Richard A. Broom, Manager of Development, Niagara Chemical Division, FMC Corporation, has served in several management positions in his 25 years with the corporation. He is a graduate of the University of Illinois.

COLLAPSIBLE CONTAINERS

by

Charles W. Kennedy & Daniel J. Gillett
Uniroyal Chemical Company
Mishawaka, Indiana

Two films were presented at the Conference to demonstrate the characteristics of these containers. The sound-track narration from each is provided for the Proceedings.

I. THE SEALED BIN CONTAINER

U.S. Navy Bulk Cement Handling System

Narrative: This is the story of a cement system and here is where the story begins: Port Hueneme, California, where in April, 1969, the Naval Facilities Engineering Command pioneered the use of a new system for handling and distributing the dry cement used by the Sea-bee's in South Vietnam.

High volume requirements coupled with severe climatic conditions and resultant high cement losses provided the impetus for development of a new method which can save the Navy about 6 million dollars in its first year of implementation, with projected annual savings in subsequent years even higher. Naval ingenuity brought to bear on a major logistical problem has yielded a new generation of cement-handling equipment, more efficient and economical than the old.

The system's initial step is the transfer of dry cement from the trailers to the fill station. Preparations are now complete for filling the sealed bins. Dust collectors, which are necessary to collect the cement dust that escapes from the sealed film as the dry cement fluidized with air fills the container, are placed in position on the fill station. A fork lift now brings the cornerstone and work-horse of the NAVAX system to the fill station. It's the 66-cubic-foot capacity sealed bin which replaces the outmoded paper bag.

Sealed bins are rugged, reusable rubber containers designed to provide cement transportation, storage and distribution capability all in one. They are easily filled pneumatically or by gravity, through either a 4-, 6-, or 8-inch top lift and, as we shall see later, emptied through a similar 8-inch bottom closure.

Sealed bins for cement are fitted with a rubber sleeve for quick attachment to the dust collector. These collapsible rubber containers are custom-engineered for the specific lading they are to transport.

The fill station, an integral part of this new system for handling and distributing dry cement, is capable of pneumatically filling 8 of these sealed bins simultaneously in 25 minutes or less. Each 66-cubic-foot sealed bin holds approximately 5200 pounds of dry Portland cement, equivalent of 53 conventional paper bags.

When the sealed bins are filled, they are pressurized with air to 325 psi which engages the internal cable assembly that gives the container added lift strength.

Sealed bins are easily handled by conventional materials-handling equipment. Here the sealed bin is hoisted by means of a 3-ton fork lift truck fitted with the lift eye adapter.

The sealed bins are now loaded onto a flat bed trailer. From the fill station the sealed bins are transported a short distance to dockside. Because of their stability, sealed bins are often transported by flat bed trailers on short hauls without any special tie-down apparatus.

At dockside the sealed bins are placed in storage until they are ready to be loaded onto the ships. Gone is the need for costly warehousing space required to protect bag cement. These rubber containers, built of rugged plies of neoprene-coated tire cord fabric vulcanized into a collapsible, yet puncture-resistant, one-piece container, are designed to withstand the most severe exposure to the elements, unprotected with no damage to lading. Sealed bins hold their contents secure, impervious to outside weather, dirt, contamination, and moisture, and it provides a closed system for bulk materials handling. It is non-corroding, varmint proof, and pilferage-free. Know-how manpower needs are greatly reduced with sealed bins. One man can move as much material in a sealed bin as several men handling paper bags. That's because a single 66-cubic-foot sealed bin is capable of holding the same volume as 53 bags of cement without the massive waste.

The ship's crane hoists the sealed bins 3 at a time by means of the same lift eye fitting that the fork-lift truck with the adapter used for hoisting it.

Six plastic-coated steel cables run the length of the container from the fitting on the top center to the bottom of the container. These internal cables give added strength, and brace the sealed bin against stress and shock. In the ship's hold, a fork lift easily stores the sealed bins for the voyage to Vietnam.

DeNang deep water piers, beginning of the sealed bins' journey in Vietnam. The 66-cubic-foot sealed bin which measures 5 ft. 5 in. high with a fill diameter of 4 ft. 8 in. and a tare weight of 215 pounds, is off-loaded and handled as we have seen previously. The 66-cubic-foot sealed bin was ideal for Navy requirements because it could be handled with existing equipment and provided an efficient loading pattern aboard ship. However, sealed bins are custom-manufactured in a variety of sizes from 50 to 300 cubic foot capacities to suit individual material-handling needs. The 300 cubic foot sealed bins are currently being used to transport cement from Seattle, Washington to Amchitca, an island far out in the Aleutians chain. Amchitca's remoteness and fierce weather made sealed bins an economically feasible means for handling the large volumes of cement and drilling mark needed to support the Atomic Energy Commission's Amchitca nuclear test program.

And the fact that the sun doesn't shine over Vietnam won't make any difference if you are using the transportation system that includes sealed bins, because they protect their lading from the elements and act as their own warehouse that can be off-loaded in almost any kind of weather.

The sealed bins' journey continues as they are transported by flat bed trailer to the Navy support activity storage area. Here they are off-loaded by a fork-lift truck and stored in the open. Notice that even with the heat, humidity, and high rainfall of Vietnam there is no need for costly covered cement warehousing facilities. Sealed bins still hold their contents secure, impervious to outside weather, dirt, contamination, and moisture.

From the Navy support activity yard, the sealed bins are loaded onto a YFU for their journey up the coast of Vietnam. They leave DaNang about midnight and arrive at Tan Ne Hoa, a Navy facility 8 kilometers from the imperial city of Hue at dawn. Upon arrival, the sealed bins are off-loaded by fork lift trucks directly onto flat beds. If transportation is not immediately available, the sealed bins can be easily stored, since they act as their own warehouses, and the vessel can be returned for another load instead of standing idle at the dock, wasting valuable time and money.

As we mentioned before, the 66-cubic foot sealed bin holds as much cement as 53 conventional paper bags, but it should be noted that the largest size of 300 cu. ft. capacity sealed bin holds as much cement as 223 conventional paper bags.

From Thanh Hai the sealed bins are transported 16 kilometers to the Sea-bee's Phu Bai cement-batching facilities. At Phu Bai the sealed bins are off-loaded and moved by a fork lift to a decanting station.

The 66-cubic foot sealed bin has an 8-inch discharge closure located at the bottom center of the container. The closure contains its own built-in sleeve fitted with a line capable of controlling or stopping the flow during this job. Cement is emptied by gravity flow onto a conveyer belt that transports it into the batching operation.

The empty sealed bins, now only 15% of their original filled cube, are sent by containerized vans back to DaNang where they are ready for retrograde shipment to Colness refilling points where their 9,000 mile journey will begin again.

II. THE SEALED DRUM CONTAINER

11th Aerosault Field Demonstration

Narrative: In the interest of helping increase the mobility of the U.S. Army, could a collapsible, reusable container for fuel or water that would easily fit into a majority of aircraft and land vehicles be developed? That was a question these tests given the 500-gallon shorty drums sought to answer during field exercises by the 11th Aerosault Division, Fort Benning, Georgia and during numerous other evaluations by us.

Prior to the development of the shorty drum, the Army had standardized on the longer 500-gallon drum being loaded here into the cargo compartment of a sky crane helicopter. The length of this original configuration was too great for the small helicopters and for some of the cargo aircraft. But it did serve to prove the concept that fuel could be carried under all kinds of battle conditions in collapsible reusable containers.

The sky crain helicopter bears the pods "sequester-drop" for carrying troops or equipment into battle areas. As part of Uniroyal's development program on the containers, we wanted to see whether multiples of the 500 gallon drum could be picked up by the sky crane without the pod. The answer is obvious. Two thousand gallons of fuel are very easily transported by attaching cable arrangements to the end fittings of the containers.

The object of the 11th Aerosault Division maneuvers was to improve the mobility of ground forces. As an example of how sealed drum containers help do this, a helicopter can deliver 500 gallon drums in single units or in multiple units if the aircraft is large enough to carry the load.

More than 25,000 drums have been purchased by the Army as a result of the evaluation that has been completed. These drums are now in Vietnam giving useful service.

One of the major goals of our test was to provide a container that could be quickly rolled off the Caribou aircraft so the plane would not be tied up on the ground for a long period. The 500 gallon container met this goal admirably.

The next test demonstrates the ability of various types of planes to deliver a number of 500 gallon drums by parachute. During this slow-motion descent of the container, note the simple board-pallet the drum has been placed upon. This allows the crewman inside the plane to push out the container without difficulty. The ruggedness of the container allows it to strike the ground with a full impact velocity of the parachute without the need for any shock-absorbing material. This impact, in slow-motion shows the tremendous ability of the flexible construction of the sealed drum container to absorb stress. During productions of these units we must test at least 1 out of every hundred with a free fall from 12 ft. to show that we continue to maintain the rugged characteristics of these drums.

Next, an extraction test performed of various military equipment. In this test a series of nylon cables are strung across the end of the runway and a hook trails from the rear of the plane. The hook catches the rope and pulls off whatever unit is being evaluated. The particular test shown here was conducted in South Korea during a world-wide tour to demonstrate the ruggedness and other capabilities of the containers. A pad car was used for a 9G deceleration test on the drum. This capability is important in the event that the containers are ever subjected to a crash condition in an aircraft or in a vehicle.

In slow motion we note the distortion of the drum as it undergoes the strain of the 9G deceleration. Of interest is the extreme wrinkling that goes on and the severe flexing of the sidewall of the container. This type of drum is far safer in emergency conditions than any rigid container could ever hope to be, because of its ability to absorb tremendous loads.

Another important advantage of the use of flexible containers is seen here. In this test conducted by a mutual insurance company, we had a 55-gallon flexible sealed drum container, filled with fuel, subjected to gas jets. Jets eventually ate their way into the container, allowing the fuel to spill on the ground. Fire was put out by simple CO_2 equipment by an operator. At the conclusion of this test we arranged for a steel 55-gallon drum to be subjected to the same condition. A 55-gallon steel drum goes off like a small atomic bomb when subjected to the same test. The build-up of internal pressure in the rigid container is one of the reasons why rigid metal drums are more hazardous in combat conditions than the flexible container.

Charles W. Kennedy is currently Supervisor of Sales Engineering in the Engineered Systems Department of Uniroyal Plastic Products, Division of Uniroyal, Inc. He is a graduate of Holy Cross College with a degree in economics, and has been with Uniroyal for 23 years.

Daniel J. Gillett, Sales Manager, Engineered Systems Department of Uniroyal, and has held a variety of positions in his 23 years with the Company, including manufacturing, engineering, marketing, and sales. He holds a degree in economics from Indiana University.

HIGH DENSITY POLYETHYLENE DRUMS

by

Sid Levine
Advanced Chemical Technology
Beverly Hills, California

Containers widely used over the years have evolved from those made exclusively of wood, including their banding, to wood with steel banding, to the newly developed all plastic high strength containers.

The reasons for the evolution resulting in this transition are many and varied. The conference this week is further evidence that evolution is necessary and will continue.

The plastic container in Europe has achieved great success during the last ten years. It has been used, among other products, for insecticides. It is now being introduced to the American market. It can be manufactured in various sizes and of many configurations - all without seams.

Blow molded containers made of special high molecular weight polyethylene resins have shown absolute consistency against corrosion, are less than one half the weight of their steel counterparts, and are considerably more impact resistant than containers produced of wood, steel or cardboard.

Polyethylene resins basically vary in two ways. The density of this family of plastics may be varied from approximately 0.92 gm./ccm. to approximately 0.96 gm./ccm. In addition to density, the molecular length of polyethylene molecules may be varied.

Containers made of high density polyethylene plastic are considerably more rigid than those made of lower density polyethylenes. This higher modulus or rigidity improves other properties such as abrasion resistance, chemical resistance, and permeability.

Increasing the molecular weight of polyethylenes to the area of 750,000 greatly improves the strength of polyethylene plastics. High density and high molecular weight polyethylene may properly be designated a "super strength" plastic with exceptional toughness and weathering properties which are ideal for large blow molded containers.

The largest container displayed at the rear of the ballroom has received Department of Transportation approval (SP 663755) for certain hazardous materials after extensive testing.

Allow me to read some excerpts first from a letter dated November 13, 1972 from an agrochemical company in Phoenix, Arizona:

> "We received your 57-gallon polyethylene drum on September 15, 1972. We filled the drum with xylene on September 19, and exposed the drum to variable temperatures. We stored it in our warehouse for two or three weeks; then we put it in the sun where the temperatures exceeded 120° F. It has also been out in weather with temperatures going as low as 28°.
>
> "Today we rolled the drum around over gravel to check for softening of the walls. There didn't seem to be any problem.
>
> "We removed the xylene and filled the drum with water. Then we dropped the full drum from a height of seven to eight feet. The drum bounced and seemed to suffer no ill effects.
>
> "We used xylene as a test material because it is the solvent used in all of our liquid insecticide formulations."

A fruit grower and processor of Ontario, California, on July 6, 1972 wrote the following:

> "On June 9, 1972 we collectively witnessed drop tests performed on the closed head 55-gallon Poly Drums. The drop tests were all over 4 feet elevation and the drums were dropped on solid concrete. The drums had been stored in our freezers full of ethylene glycol for over one month at below 0° F. They were dropped immediately upon removal from the freezers.
>
> "The Poly Drums we witnessed all passed the subzero ° F drop tests as described above without any sign of failure. We witnessed no leaks, only minor scratched and scuffed surfaces."

The proper distribution of tension is achieved through a combination of the use of high density PE and the "belly barrel" shape, the latter also serving to avoid the development of sharp edges. The physical design, coupled with a unique mold design, makes it possible to obtain a distribution of the material, where desired, inside or outside of the drum. This makes light weight with physical strength possible, and therefore safe and dependable transportation and handling. It is resilient and deters puncture.

Further, the shape of the container, without seams or chimes with sealing compound (the edge protruding beyond the head) and the inherent molded flanges, makes it possible to completely empty the contents from the container.

Because of this unique seamless design, reconditioning for reuse is facilitated, making it possible to have many additional safe trips. In lieu of reconditioning as a container, the PE can be recycled by being reground and used in products other than containers. These grinding units can be installed at disposal sites within a workable radius of the users. A color coding for hazardous materials can be readily feasible because of the inherent color and of any selection.

Certain chemicals in either liquid or gaseous form may permeate even high molecular and high density blow-molded polyethylene containers. Significant development has been made to remedy this partially limiting disadvantage of polyethylene containers. A "sulfonation treatment" as described in Modern Plastics, July 1972, shows promise of converting the permeating problem chemicals to completely packageable commodities.

Sid Levine is Container Consultant to Advanced Chemical Technology. He is a graduate of the University of Southern California with a B.A. and J. D. degree. He is former Vice-President and Chief Engineer of H. Levine Cooperage and President of Industrial Manufacturers' Limited and Vice-President of Med-A-Safe Child Safety Container Manufacturers.

A movie was shown in conjunction with the above presentation.

NEW DESIGNS FOR CLOSURES ON PESTICIDE CONTAINERS

by

Haron Wise and Clarence Dearing
American Flange & Manufacturing Co., Inc.
New York, New York

1. Item: Oversize Cap Seal
Description: Steel 2" and 3/4" size with side gasket
Application: Standard 2" and 3/4" fittings
Purpose: Improved sealing characteristics (particularly when used on reconditioned drums which have been subjected to the burning process for reconditioning).

2. Item: Nylon Plug
Description: 2" and 3/4" molded nylon plugs available with wide gasket selection (FDA approved).
Application: For use with standard 2" and 3/4" flanges. (Particularly applicable for use in prelacquered flanges for lined drums and pails)
Purpose: Wide chemical compatibility characteristics. (Can be used for a wide range of chemicals requiring containers with lined or coated interiors.)

3. Item: Ring Closure
Description: A metal-jacketed polyethylene flange with a hand-removable ring-pull diaphragm, a 2" polypropylene plug (available with or without a 3/4" polyethylene plug) and aluminum cap seal.
Application: For use on 22-28 gage steel or fibre, unlined, poly-lined or coated drums. (All parts of closure which may come in contact with the contents or interior of the drum are plastic and are fully compatible with coating or poly lining.)
Purpose: Provides less expensive closure where total drum recycling or burial is desirable. Can be completely resealed with use of aluminum cap seal after opening and emptying allowing for return of container to reconditioner.

4. Item: 2-1/4" Press closure (Experimental)
Description: A molded polyethylene closure with captive cap and an easily removable leak-proof tamper-proof ring-pull diaphragm.
Application: For use in both plastic and metal pails where an all-plastic closure is desirable. Offers large opening for higher filling speeds, also ease of insertion on semi-automated equipment.
Purpose: Aids in total recycling of plastic container. Captive cap offers complete resealability for safety in handling or disposal of empty containers.

5. Item: Bonding closure (Experimental)
Description: A molded polyethylene closure with self-sealing screw plug.
Application: For use on plastic containers with molded 63 mm opening. (Offers standardization on molded opening to common 63 mm neck finish.)
Purpose: Intended for use where all-plastic closure is desirable. Offers a 1-3/4" screw plug closure and can be used in conjunction with 2" plastic cap seal for protection against tampering, pilferage or dilution or for resealability of empty containers where required for transport or disposal.

6. Item: 2-1/4" Clinch-on blank closure
Description: Stamped and formed tin plate closure for 67 mm clinch-on opening.
Application: For use on 5-gallon metal pails in conjunction with another type closure for dispensing product.
Purpose: Offers large fill opening for faster filling speeds. Can be supplied precoated or lined for use on pails requiring interior linings. For use in lieu of 2" flange and plug where this type fitting is used only for filling containers. Can be fitted with 3/8" vent where venting is required.

7. Item: 2" Molded opening in head of plastic pail.
Description: A molded opening which can accommodate a 2" self-sealing plastic plug and a 2" aluminum cap seal.
Application: For use on plastic pail where the container might be used as an integral part of the dispensing mechanism.

Purpose: Offers the possibility of a closed system where the pail as an integral part of the spraying device or dispensing mechanism might be used as a tank or reservoir. Can be easily and completely sealed against pilferage or dilution of the filled container and offers total resealability of the empty container if required.

DISPOSABLE INNER LINERS - TESTS FOR PERMEATION

by

R. F. Thomas
Residue and Special Projects Laboratory
Environmental Protection Agency
Beltsville, Maryland

During the growing season of 1970, there was a significant increase in pesticide-related accidents reported from the tobacco producing areas of the southeast United States. This increase was thought to be due primarily to using more toxic organophosphate formulations to replace organochlorine types, many of which had been cancelled. Investigation of these accidents revealed that a substantial number were the result of various types of mechanical failure of the containers.

As a result, two courses of action were open to the Pesticides Regulation Division, Environmental Protection Agency: (1) extensive revision of the labels for gallon sizes of parathion, and (2) development of an improved container for parathion and other highly toxic liquids. The decision was made to investigate both courses.

The following objectives were set forth for an "idealized container":

1. Complete emptying. Emptying is difficult to attain in a literal sense. In a practical sense, the "empty residual" means an available volume of less than a teaspoonful for toxic substances.

2. Quality construction in both material and assembly, such as the ability (strength) to withstand the handling and mishandling of transport, storage, and use.

3. Easy pouring and/or closure arrangement. The design and placement of pour fittings are a factor of both filling and pouring. Well-designed pour fittings help eliminate or reduce spillage, splashing, and drip hazards as well as "empty residual."

4. No permeation. The permeability of the container is of great concern, and especially so if the contents

are highly toxic. Some of the common causes of permeation are mechanical rupture, corrosion, chime seepage, and failure of the closure. Appropriate liners can dramatically reduce potential permeation hazard.

5. No hazard in recycling and disposal. The container reconditioning industry places no value on a gallon container; however, such containers may frequently be diverted to other uses. To help prevent the development of hazardous situations, the container (or some part, i.e., a removable liner) can be made in such a manner as to be readily disposable.

These considerations led to studies of liners, outer container residues, shelf-life permeation, coatings, liner materials, fabrication, etc. One gallon sizes were used as a prototype.

The pesticide formulation used for testing was 79% parathion in a xylene base. Preliminary testing with small polyethylene cylinders with various coatings preceded studies with the one gallon size container and liner. The one gallon containers used in the study were a commercially available bucket (Vulcan Containers, Inc.) fitted with a septum port for head space sampling. The liners were Hedwin Cubitainers(R) and were made of low density polyethylene coated with nylon, polyvinyl or epoxy. Uncoated liners were also tested as a comparison check. In addition, laminate pouches fabricated of two layers of high density polyethylene with aluminum between were tested.

The liners, containing varying amounts of the parathion formulation, were placed in the buckets which were then sealed with the locking ring.

After a 60-, 90-, and 120-day storage, head space air samples were taken and analyzed for parathion. At the end of 120 days' storage, the buckets were opened, and both the outside of the Cubitainer and the inside of the bucket were washed with a solvent (hexane) to remove any parathion. The washings were adjusted to an appropriate volume and analyzed for parathion using gas chromatography with flame photometric or electron capture detectors.

After 120 days there was no permeation through the laminate pouches. However, there was some evidence of delamination and it was found that this material was subject to "pin hole" effect where sharp bends occurred. It would seem that there is potential for this material as container liners. After 120 days the maximum head space concentration of parathion for the epoxy coated liners was 0.02 ppm and the total parathion permeation (liner and bucket) was about 10 mg. The total permeation for the nylon coated liners after 120 days was about 30 mg while the maximum head space concentration was 0.07 ppm. The uncoated liners were about eight times more permeable than the nylon and epoxy coated liners.

The polyvinyl dichloride coated liners were more permeable than either the epoxy or nylon coated Cubitainers. There was no apparent difference in total permeation whether liners were partially filled or full.

In conclusion, the results of these and other tests indicate that a suitable container liner can be developed which may be successful in solving packaging problems associated with toxic materials such as parathion.

Ronald F. Thomas is Supervisory Chemist for Residue and Special Projects, Technical Services Division of the Office of Pesticides Programs, EPA. His laboratory is located at the Agricultural Research Center, Beltsville, Maryland. He graduated from Washington College, Chestertown, Maryland, as a chemist, and has since held chemist positions in the Food and Drug Administration, USDA and EPA.

DESIGNS FOR METAL PAIL LINERS AND SHIELDS

by

Charles A. Speas
Hedwin Corporation
Baltimore, Maryland 21211

In 1970 we were contacted by scientists from the Environmental Protection Agency concerning the need for a special plastic liner for a 1 gallon steel pail because we make industrial plastic containers which consist primarily of "composites", i.e. light weight polyethylene liners in steel and fiber drums and corrugated cartons. EPA expressed the potential need by outlining the following requirements:

1. Product to be tested would be parathion in xylene solvent, currently allowed (by DOT regulations) in a tight head, 1 gallon steel pail. This container was thought by EPA to have certain deficiencies which could be corrected by modifications as listed below.

2. On the assumption that the pail might be reused for a number of purposes following emptying, a plastic liner was suggested to prevent contamination of the inside wall of the pail.

3. Plastic liner should be as permeation-resistant as possible to parathion.

4. Plastic liner should be "unattractive" in terms of potential reuse. For example, a film bag would be good in this respect; a molded plastic bottle would not.

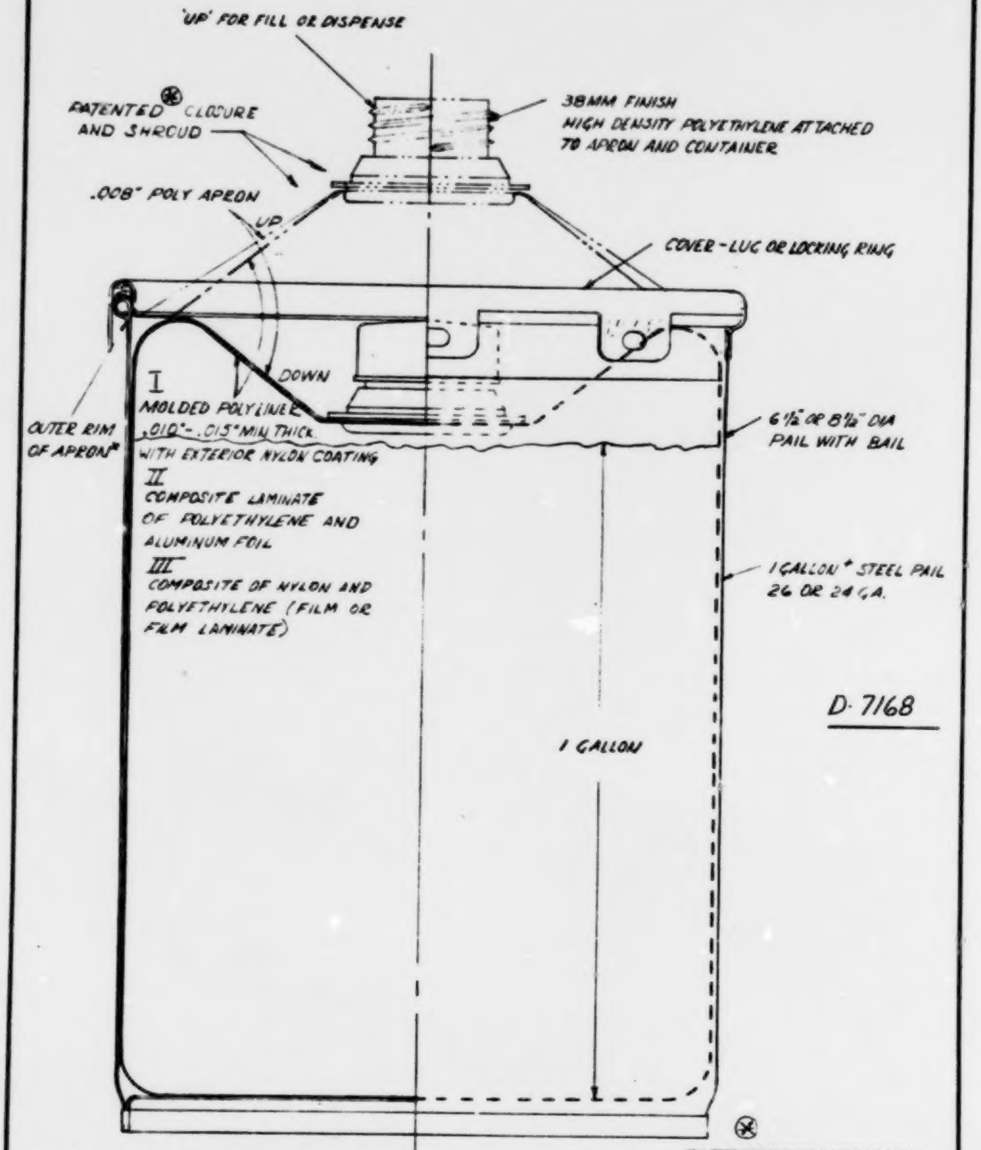
5. Complete drainage needed on dispensing -- 1 teaspoon, maximum residue.

6. Composite unit should be equipped with a hood or shield of some type to prevent entry of the parathion between the liner and the pail during filling or dispensing.

During 1971 and 1972 the EPA has run permeation tests on various types of plastic liners made by us. Mr. Ron Thomas of EPA has described the results of these tests. It appears that some plastic liner can be found to meet all of the above requirements. A specific version of a 1 gallon container is shown herewith.

At this stage of the game we can say that the basic work in construction and permeation testing has been completed. However, further development is required with potential users (chemical companies) before such a container can be successfully applied in the field. There are many problems relating to marketing and field application which can only be worked out with the pesticide manufacturers. Hedwin is most anxious to continue with this further investigation in an effort to help the EPA and the pesticide manufacturers achieve further improvements in safe packaging, dispensing and disposal of pesticides.

Charles Speas is Vice President, Technical, of the Hedwin Corporation, Baltimore, Maryland, where he has worked for the past 17 years. He is a graduate of MIT in mechanical engineering, and has recently completed his masters degree in management sciences at Johns Hopkins University.


'UP' FOR FILL OR DISPENSE
PATENTED ⊛ CLOSURE AND SHROUD
38MM FINISH
HIGH DENSITY POLYETHYLENE ATTACHED TO APRON AND CONTAINER
.008" POLY APRON
UP
COVER - LUG OR LOCKING RING
DOWN
OUTER RIM OF APRON*
I
MOLDED POLYLINER
.010" - .015" MIN THICK.
WITH EXTERIOR NYLON COATING
II
COMPOSITE LAMINATE OF POLYETHYLENE AND ALUMINUM FOIL
III
COMPOSITE OF NYLON AND POLYETHYLENE (FILM OR FILM LAMINATE)
6½" OR 8½" DIA PAIL WITH BAIL
1 GALLON + STEEL PAIL 26 OR 24 GA.
D-7168
1 GALLON
⊛

* TOP 'APRON' APPROX .008" LOW DENSITY POLYETHYLENE, THERMOFORMED TO EXTEND FROM BASE OF 38MM NECK TO OVER AND UNDER PAIL BEAD TO PREVENT SPLASH OF LIQUID FROM ENTERING INTO SPACE BETWEEN LINER AND PAIL DURING FILLING AND DISPENSING

[redacted] Patents
U.S. 3,124,282
U.S. 3,599,840

FRACTIONAL TOLERANCE ±1/64
DECIMAL TOLERANCE ±.005
UNLESS OTHERWISE SPECIFIED
MATERIAL ______

NO. REQ	NEXT ASSY.	USAGE

1971-1972; E.P.A., Washington D.C. Concept approved for use with poison pesticides; permeation tests conducted - Beltsville, Md.

LTR.	DATE	REVISION	BY
A	3-18-76	[illegible] EPA APPLICATION – CHOICE OF LINERS I, II, III	CAS

1 GALLON 'PRESSURE PAIL'
WITH 'APRON' TOP

DRAWN: W. R. FISHER
DATE: 10-22-70
CHECKED: CAS
SCALE: FULL
DL-129

[redacted]

D-7168-A

CRITIQUE AND ASSESSMENT OF PLASTIC LINERS

by

H. Moss, Jr.
Shell Chemical Company
San Ramon, California

As I see my role on this subject it is somewhat that of playing the devil's advocate. Neither Ron Thomas nor Charley Speas have represented their development as a general panacea. What it is, is one step in the right direction. What are the pluses?:

a. The ability to remove the liner, leaving a clean pail.

b. It should be a relatively economical liner.

c. The contaminated liner can be compressed resulting in better utilization of space.

d. The liner can be incinerated.

e. Fittings are protected from external damage.

f. It has the advantages of a double wall container in the event of a poly seam failure.

g. Less product should adhere to poly and the convex head permits better drainage.

And some of the minus points:

a. The obvious, the permeability of polyethylene when used to contain petroleum hydrocarbon solvent-based formulations.

b. Some minor problems which I would categorize as having relatively easy solutions including:

   1. Possible need for a self-venting feature

   2. An easier way to pull out the liner, particularly while wearing gloves

c. The problem involving the temptation to reuse the container. The removal of the liner will probably give the pail the appearance of a mint pail when we should recognize that the environment that the pail is used in is alone reason for destructive disposal.

d. Educating disposal site operators and/or scrap outlets that despite the label on the pail it is suitable for handling in a dump or scrap operation.

e. Possible problems with air pressure in filling and uncapping for end use. Positive air pressure between the membrane and the steel walls could pop up product when uncapping.

Please bear in mind that there has been no opportunity to field test the container discussed here. It has been my experience that there is no substitute for actual use in the field. Until the goal is achieved, however, in finding a non-pervious liner it is somewhat doubtful if large scale field testing is desirable. Those pesticides that are most likely to have a high mammalian toxicity are, more than likely, formulations to be found in small containers and with a solvent carrier which migrates through polyethylene.

Herman "Hank" Moss, Jr. is Product Distribution Manager, Agricultural Division, of Shell Chemical Company in San Ramon, California. He has worked 25 years with Shell, and the last six years in the Agricultural Division. He is a graduate of New York University.

CONTAINERIZED TRANSPORT FOR CHEMICAL PRODUCTS

by

J. E. Zehner
Strachan Shipping Company
New Orleans, Louisiana

I would like to thank Dr. Preston for asking me to meet with you today. This is a welcome opportunity to spread the word about containerization. Our main emphasis today is to discuss how the containerized transport of chemicals can help control contamination of the environment as well as other goods plus save you money.

Containerization is not a new concept by far. Even in ancient times merchants found they could reduce costs, cut damages and speed their shipments by packing small products into large containers. These containers were often as simple as clay pots, but the idea was there. For many years crating was the answer; however this made it difficult for transporters, overland as well as ocean carriers, to plan stowage, as each crate was a different size. In the early 1940's the "conex" container was introduced primarily for the military. It quickly developed into a varity of "dravo" or eight-foot units which preceded the modern intermodal container.

The intermodal or standardized container appeared on the scene in the 1950's and has revolutionized the transport of goods by sea. Intermodal containers are available in 20, 30 and 40 foot lengths, are eight feet wide and generally eight feet high. The twenty footer is presently the work horse and has an approximate interior cubic of 1060 cubic feet with a payload of about 39,500 pounds. Thirty footers are rather rare at this time; however some steamship companies which own their own fleet of units do offer them. Approximate interior capacity of a forty footer is 2200 cubic feet with a structural payload of about 62,000 pounds. However, due to highway weight restrictions, a container which is to be transported overland in the Gulf area cannot exceed about 43,000 pounds payload.

Most standard dry 20 and 40 foot containers are fitted with one set of doors at one end. The locking device on these doors is very similar to that of a highway trailer.

Some units are equipped with side doors as well as end doors. Other specialized units such as tank containers for transport of liquid and dry bulk commodities and open top units for carriage of machinery are available. Most lines in the Gulf area lease their containers from container leasing firms; however, others do own their own fleet of containers.

When stuffing, or filling, an intermodal container for the transport by sea, special care should be taken. Most of you are quite familiar with stowing a highway trailer which is subject to stresses of acceleration and deceleration. It should be kept in mind, however, that the unit will be subject to roll, pitch and yaw while at sea. Also you should be certain the load is evenly distributed, as the container will be lifted during loading to and discharge from the vessel, whereas the highway trailers will not. These factors should be taken into consideration when stuffing a unit. They are even more important when handling hazardous commodities such as insecticides, pesticides or other chemicals.

Most steamship lines offer shippers several options on the movement of containers. Three basic types of booking are available:

1. House to house: this is the most common and most advantageous to you gentlemen who need to protect your goods, as well as the environment, from damage. Basically house to house means exactly what it says. The steamship line makes the container on chassis (trailer) available to the shipper, rent free, at the lines pier. The shipper then transports the unit at his expense to his plant where he fills the unit, locks and seals it. The unit is then returned to the pier and loaded on board a vessel. At the country of destination the same process occurs in reverse. This means that when the shipper fills and seals the unit he knows the next person to touch the goods will be his customer. This is of special benefit when shipping high value goods or goods which are subject to contamination. Most lines also offer a discount from the ocean freight for house to house shipments.

2. Another mode of booking is house to pier or pier to house. For pier to house the shipper would transport his goods to the ship lines pier by conventional means. The cargo would then be packed into a container at the pier by dock labor and loaded onto the vessel.

At the discharge port the receiver would be allowed to take the unit to his warehouse to be emptied and return the empty unit to the ship lines pier. House to pier would be basically the reverse of pier to house.

3. The last type of container booking would be pier to pier. For this type of booking the shipper would transport his goods to the pier by conventional means. The goods would be filled into a container then loaded on board a vessel. On discharge the unit would be stripped on the pier and the receiver would transport goods inland by conventional means. This mode is of course of least advantage to shippers. And many lines impose a surcharge on pier to pier bookings.

To illustrate the point that house to house containerized shipments will protect your cargo as well as save money, let us follow a noncontainerized shipment from a shipper's plant, inland U.S., to a customer's plant in a foreign country.

1. The cargo is loaded from the plant loading dock into either truck trailer or rail car.

2. The cargo is then transported to the ship lines pier where it is removed from the truck or rail car and placed on the pier to await the vessel. Any bags which rupture due to handling will spill their contents on the pier and surely send residue into the wind.

3. The cargo is then loaded to the vessel and stowed bag by bag in the hold of the ship.

4. On discharge the cargo is removed in the same manner and placed on the pier at the port of destination.

5. The customer will pick up the goods by either rail or truck, once again chancing rupture of bags.

6. Finally the cargo is removed from the rail or truck at the customer's warehouse.

As you can see there are six handlings of the cargo during which it can become damaged. Even though all parties do take care in handling all cargo, accidents do happen.

On the other hand if a shipment is sent in a house to house container, the cargo is handled only twice: when the shipper fills the unit at his plant, and when the customer empties it at his warehouse.

In addition to savings on freight, containers afford protection against costly and bothersome cargo claims. It has been our experience that cargo shipped house to house is virtually claim free. Insurance rates, by the way, are also lower when you ship by container.

You may ask how do I make a house to house container booking and what is it going to cost me? To begin, have your local forwarding agent at the port contact the ship line with which you wish to book the cargo. This line will reserve space on the vessel and arrange to make a container available at the pier. Your forwarder will then have to arrange to pick up the container and transport it to your plant. Generally this is done either by truck line or by rail carrier.

At present most truck lines in the Gulf area are reluctant to handle containers, especially 20 footers. However the trend is slowly reversing, and we foresee full participation by over-the-road carriers soon.

Presently the principal manner by which containers are shipped is by rail. The railroads offer many plans to move containers, the two most advantageous being Plan 2 and 2 1/2.

Plan 2 is a door to door mode. The railroad will pick up the empty container on chassis from the ship lines pier, dray to the nearest rail ramp, ramp the trailer onto a car, and haul it to the nearest ramp to your plant. They will then dray the unit to your plant. When you have filled the unit, the railroad will then return the unit to the ship lines pier in same fashion as the movement to your plant. As stated you will be responsible for the movement. However, bear in mind, under this plan the "empty haul" is free and you pay only for the full or revenue haul. Plan 2 rates are assessed on a commodity basis.

Plan 2 1/2 ramp to ramp is similar to plan 2. However, the railroad does not do any of the drayage which would have to be arranged separately. This is advantageous to those of you who have your own truck tractors, as you can pickup and deliver from rail ramp at the point of stuffing; and you will have to arrange for a drayman at the port. Of course, Plan 2 1/2 rates are lower than Plan 2 and are generally assessed on a F.A.K. basis. As with Plan 2, the empty haul is free.

Recently certain railroad companies have canceled or amended the services and terms of Plan 2 and Plan 2 1/2. Be sure to check with your local railroad sales agent regarding the services he offers.

The growth of containerization is accelerating at an ever-quickening pace. The appearance of the new barge-carrying vessels on the scene has now made the container even more flexible and will bring even greater savings to shippers.

We certainly don't suggest that containers represent the solution to every shipping problem; however, we do feel that they do reduce the number of problems. If you feel your product is containerizable, have your traffic people look into containerization. Your steamship agent will be glad to assist you in arranging for equipment, getting rates, etc.

Thank you.

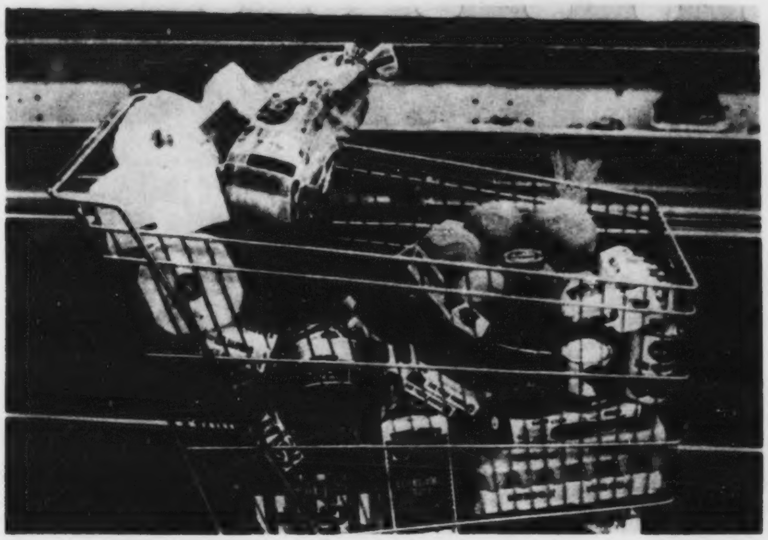
Joseph E. Zehner, Jr. is Manager of the Container Division of Strachan Shipping Company. He attended LSUNO, and completed a course in accounting from Soule Business College. He joined Strachan Shipping in 1965 and served in Traffic and Accounting until 1970 when he moved to the Container Division.

RINSE AND DRAIN PROCEDURE

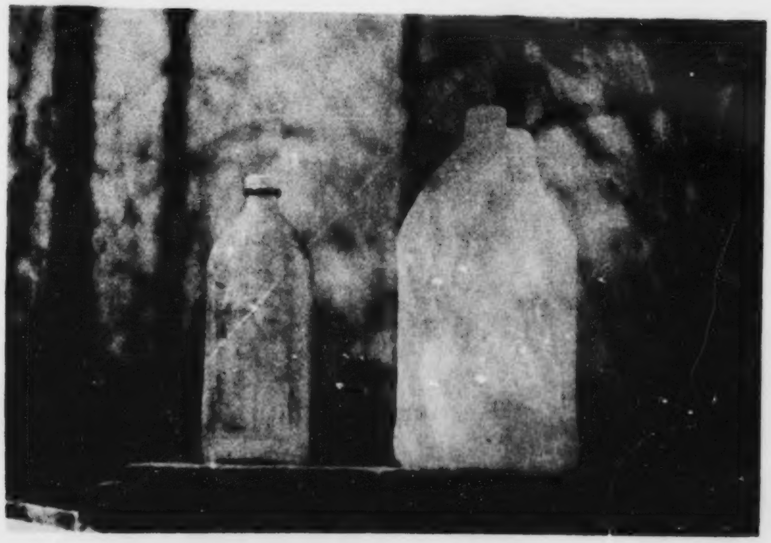
by

Denis Hayley
National Agricultural Chemicals Association
Washington, D. C.

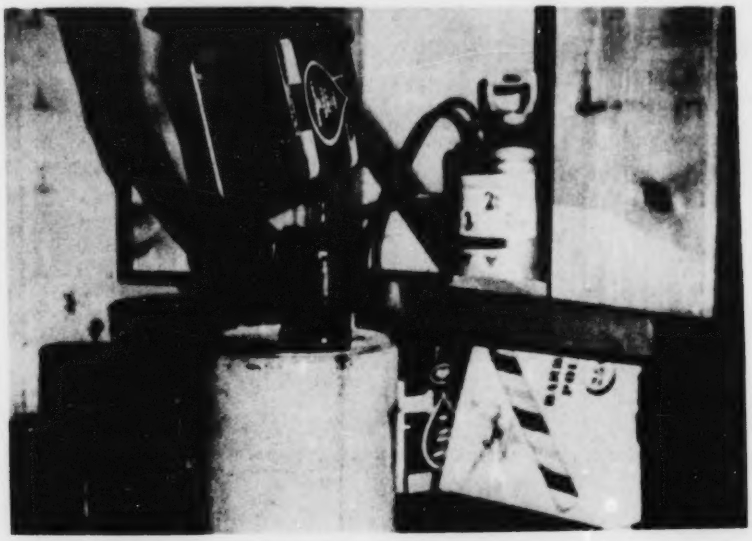
Slide #1 (Dump Site) - Disposal of the wastes from modern society is a big problem. Some say we are being buried under a mountain of packaging materials, containers and just plain litter.



Slide #2 (Product Display) - Most products are packaged so that they will reach the consumer in good condition. Technology for disposal of this myriad of containers has been outstripped by new packaging technology, but there is progress being made.



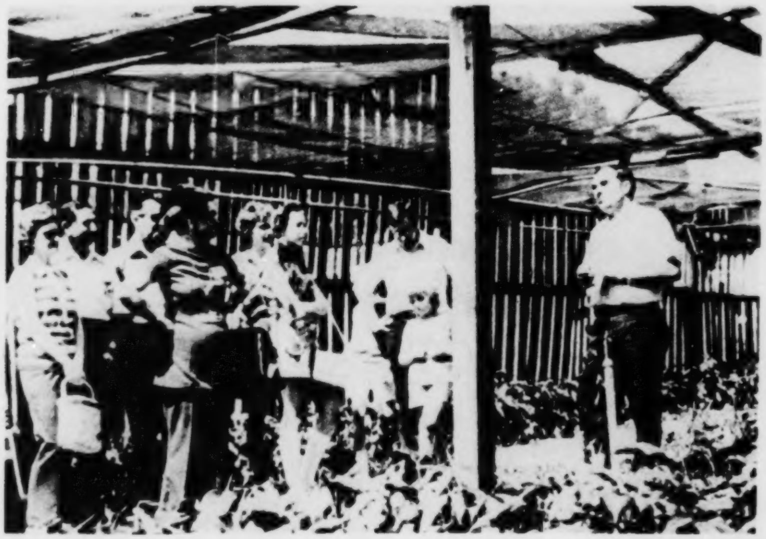
Slide #3 (Empty Containers) - Disposal of used pesticide containers which have held liquid formulations presents an area of growing concern. It's a complex problem involving solid waste -- an active chemical -- and potential for human hazard and contamination of the immediate environment if not handled properly.



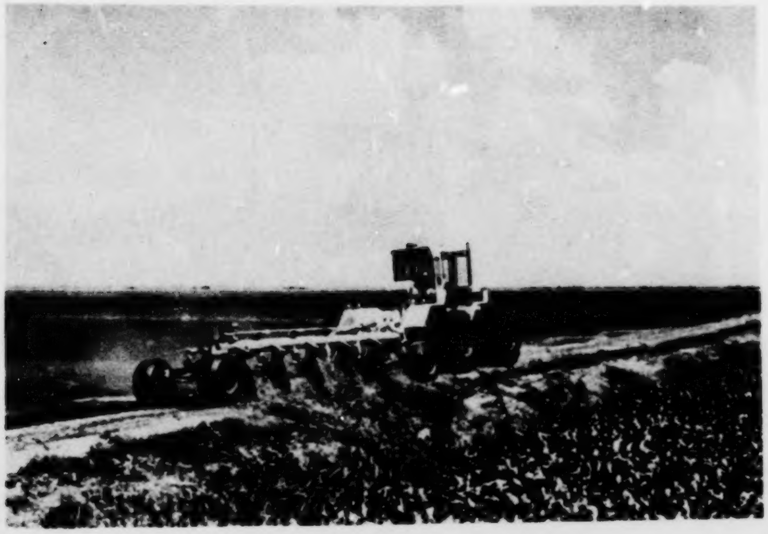
Slide #4 (Pouring Pesticide into a Bottle) - Hazard potential is greatest when used containers are left where they can get into the wrong hands. Children accounted for more than half of all pesticide accidents recently reported by the National Clearinghouse for Poison Control Centers.

Slide #5 (Child Drinking From Bottle) - Carelessness by some adult member of the family was a likely factor in most - if not all - incidents. Since even so-called "empty containers" usually contain a small amount of the original contents, a potential hazard exists.

Slide #6 (Emptying Container) - Concentration of used containers in one spot -- such as a farm dump -- increases the potential for environmental contamination. Runoff from such areas may reach waterways and result in localized fish kills or damage to other parts of the environment.

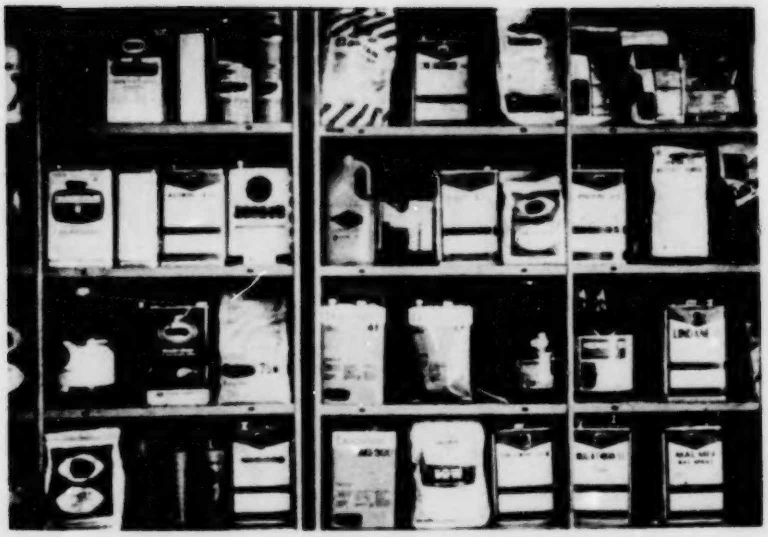


Slide #7 (Group Meeting) - Many concerned groups and individuals are looking for ways to improve the environment. Some seek court action against offenders -- while others look for ways to improve the basic approach to such problems.

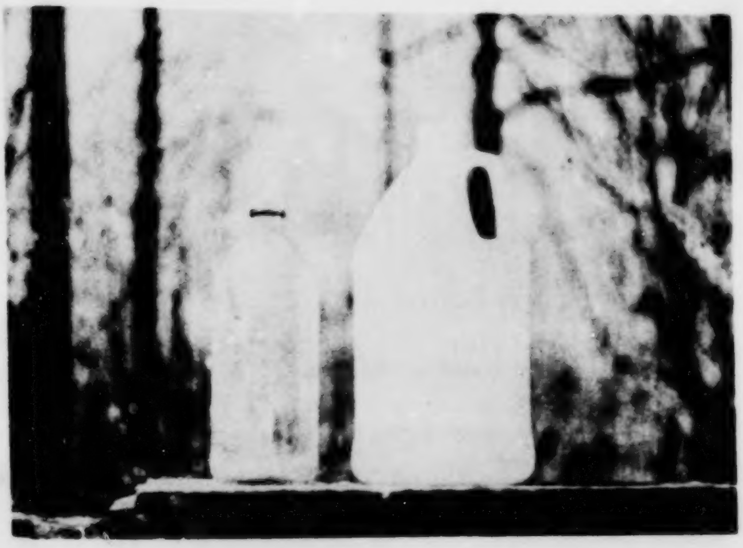


Slide #8 (Large Tractor) - The ability to accept change, and in many instances to bring about change has long been a major factor in the dynamics of American agriculture.

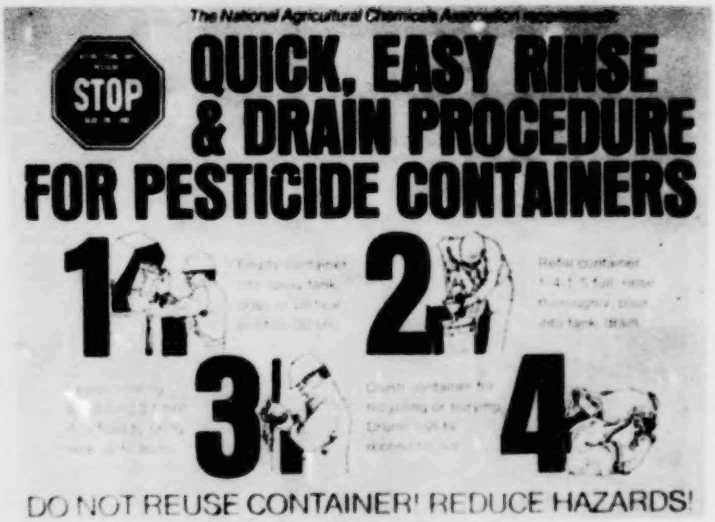
Slide #9 (Dump Area) - Being aware of a problem is but the first step to a solution. Careful study is needed to achieve an orderly solution. Current concerns for the environment have validity and will help shape the direction of future change. Some remedies will be costly. Others will involve little more than common sense.



Slide #10 (Pesticide Display) - The agricultural chemicals industry has been working on improved container disposal for many years.



Slide #11 (Empty Containers) - But until the ultimate techniques for disposal are perfected, the nagging problem of what to do with containers - perticularly those used for liquids -- must be dealt with in the present state of the art. The first step is to separate the chemical problem from the solid waste problem as effectively as possible.



The National Agricultural Chemicals Association recommends:

STOP

QUICK, EASY RINSE & DRAIN PROCEDURE FOR PESTICIDE CONTAINERS

1

2

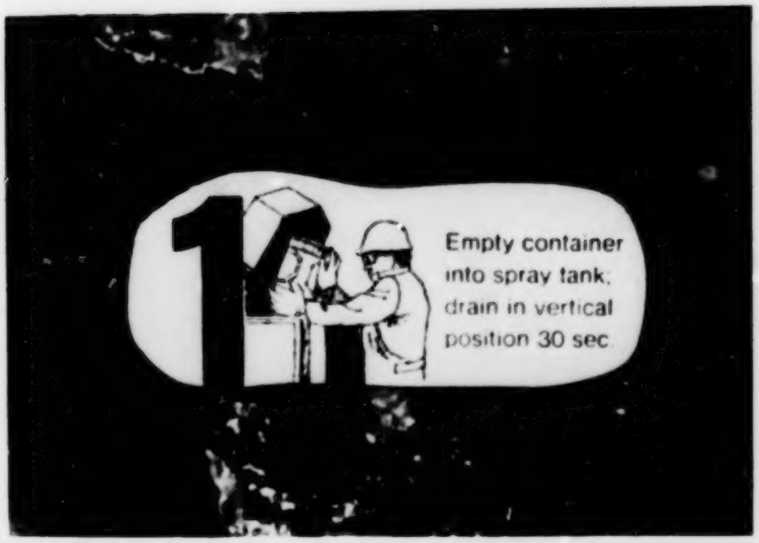
3

4

DO NOT REUSE CONTAINER! REDUCE HAZARDS!

__Slide #12__ (Rinse/Drain Poster) - A simple rinse and drain procedure will greatly reduce the concentration of pesticide material remaining in such containers.

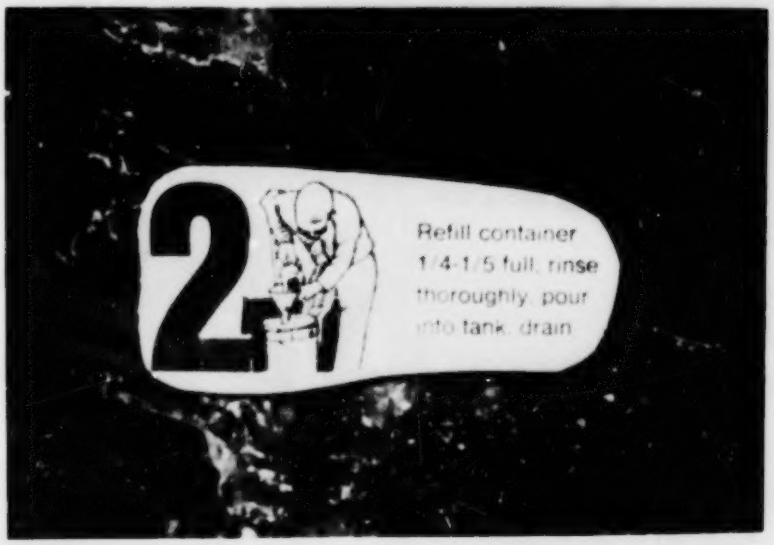
__Slide #13__ (Field Spraying) - Rinsing is done when you are mixing spray materials for application, and the rinse is always added to the tank mix. The method is easy -- and economical since it lets you use all the material you bought for pest control.



1

Empty container into spray tank; drain in vertical position 30 sec.

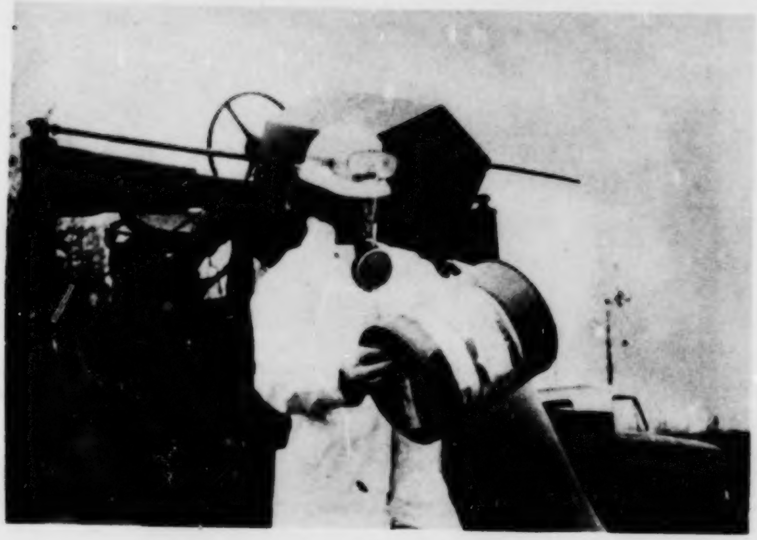
Slide #14 (1st Step) - First, empty the container into the spray tank and allow an extra 30 seconds for draining the container in a vertical position. Don't allow less than 30 seconds, since the effectiveness of the procedure is based on a dilution factor. Complete draining is important.



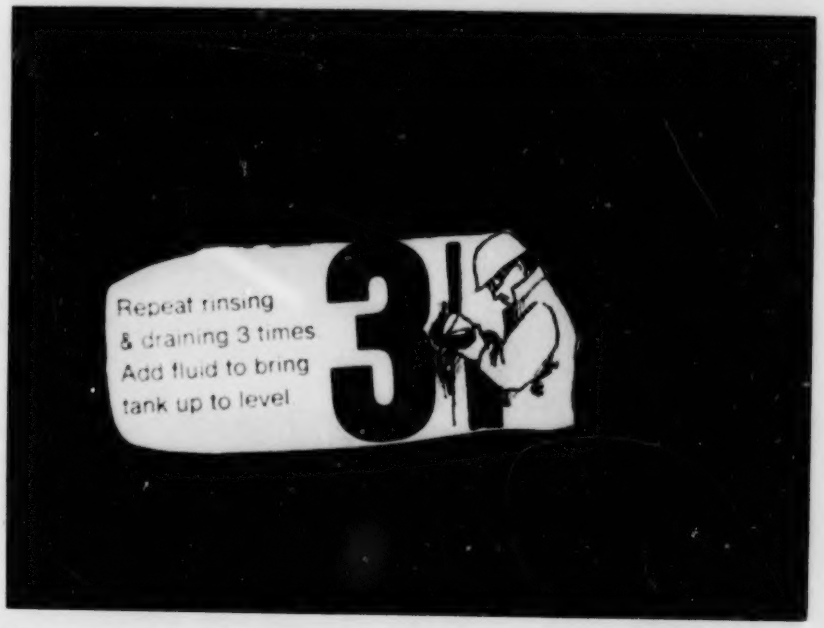
2

Refill container 1/4-1/5 full, rinse thoroughly, pour into tank, drain

Slide #15 (2nd Step) - Next, refill the container 1/4 to 1/5 full with water or other material you use to dilute the pesticide in the tank mix.

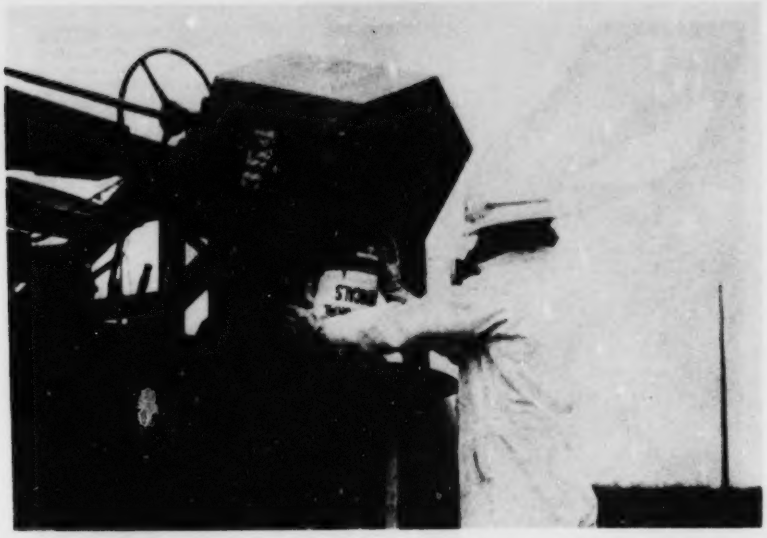


Slide #16 (Shaking Container) - Replace the cap and shake or rotate the container to rinse the inside surface thoroughly. Add the rinse to the spray tank, again allowing 30 seconds for complete draining in a vertical position.

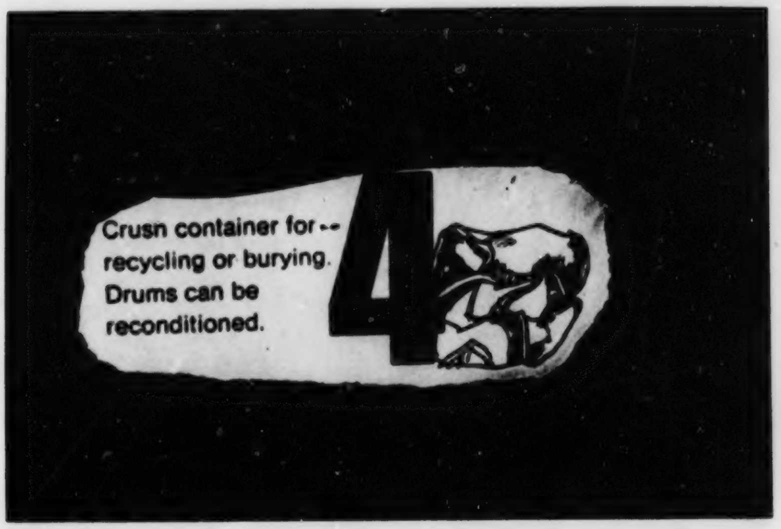


Repeat rinsing
& draining 3 times
Add fluid to bring
tank up to level
3

Slide #17 (3rd Step) - Repeat the procedure for a total of 3 complete rinses. Be sure that the entire inside is rinsed each time -- and always add the rinse to the tank.



Slide #18 (Pouring Into Tank) - Adding the rinse to the tank avoids possible contamination of soil and water and puts the material where you want it -- on the field.

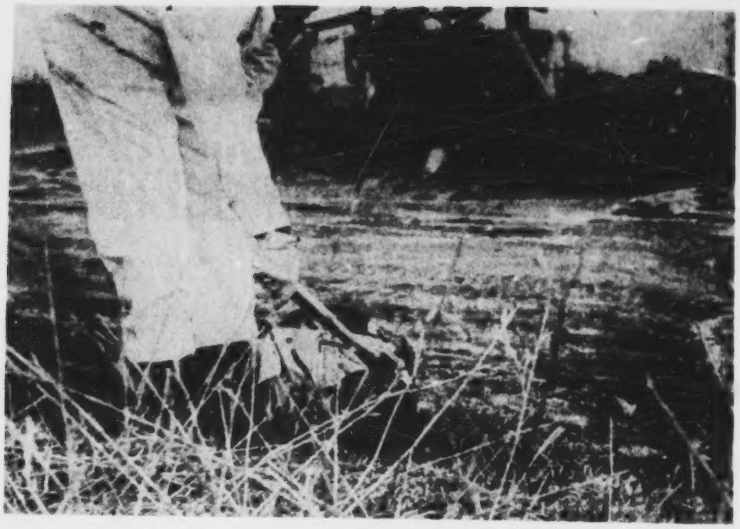


Crusn container for -- recycling or burying. Drums can be reconditioned.

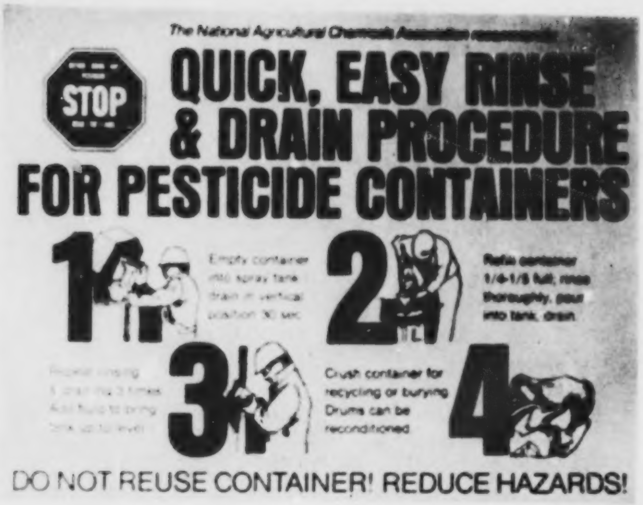
Slide #19 (4th Step) - After it has been rinsed 3 times a container will still contain a small amount of liquid. But is will be highly diluted because you will have reduced the original concentration by more than 1000-fold! Even so, do not reuse the container.

Slide #20 (Punching Holes) - Puncture the top and bottom of the container to make sure that it won't be used again.

Slide #21 (Special Tool) - A special tool has been developed to allow complete draining of metal containers and prevent reuse.



Slide #22 (Chopping with Hatchet) and Slide #23 (Landfill) - Lacking this tool you should still puncture the container and dispose of it according to local regulations. This may include crushing and burying on the farm, disposal at a sanitary landfill, or recycling through a drum reconditioner.



The National Agricultural Chemicals Association recommends

STOP

QUICK, EASY RINSE & DRAIN PROCEDURE FOR PESTICIDE CONTAINERS

1 Empty container into spray tank, drain in vertical position 30 sec.

2 Refill container 1/4-1/5 full; rinse thoroughly, pour into tank, drain.

3 Repeat rinsing & drain 3 times. Add fluid to bring tank up to level.

4 Crush container for recycling or burying. Drums can be reconditioned.

DO NOT REUSE CONTAINER! REDUCE HAZARDS!

Slide #24 (R/D Instructions) - When using pesticides the spray job isn't finished until the used container is properly disposed of and this starts with the Rinse and Drain procedure.

Denis Hayley is Secretary-Treasurer of the National Agricultural Chemicals Association, where he has also held positions as Treasurer, Director of Information, and Editor of NAC News Services in past years. Born in Southport, England, he graduated from VPI with a degree in horticulture. He has since worked for Tobacco By-Products and Chemical Corporation in Kentucky, was a U. S. Naval Officer in World War II, and held sales management positions in Black Leaf Products.

PESTICIDE CONTAINER DISPOSAL AND RECLAMATION SYSTEM

by

James T. Conner
Washington, D.C. Representative, Chemagro
Kansas City, Missouri

Objective

Develop a practical method to provide for the orderly and safe disposal of all sizes of metal pesticide containers.

What Can This System Accomplish?

-- Removes dangerous chemical residues from the environment.

-- Reduces potential hazards to humans and the environment.

-- Resolves the empty container problem where it occurs.

-- Relieves the countryside of the unsightliness caused by these containers and improves the aesthetics of the environment.

-- Solves pesticide and other solid waste problems.

-- Provides for the disposal of toxic residues and drums by professionals.

-- Lends its use application to other solid waste problems.

-- Creates a new industry, thereby providing for additional employment.

-- Reclaims and recycles strategic natural resources.

-- Flexible. Can be either mobile or stationary. Power supply can be either static or hybrid.

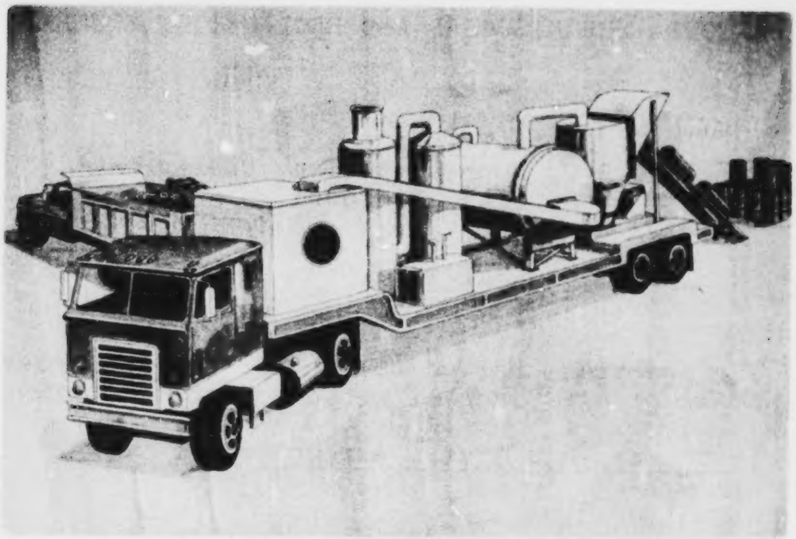


Figure 1
(no legend)

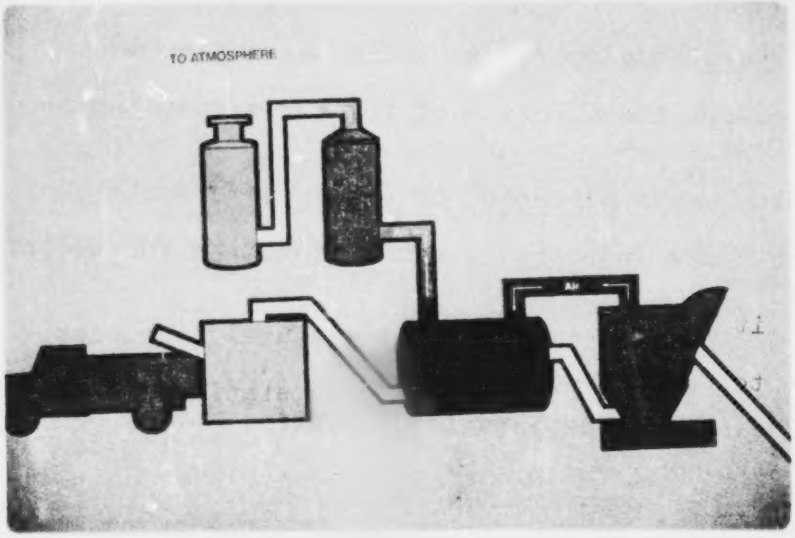

TO ATMOSPHERE
Air

Figure 2
(no legend)

General Concept of Method

This method would utilize existing technology which has already been developed in both public and private sectors. It would further consolidate the available state of knowledge in all of the disciplines involved, particularly in mechanical and thermal engineering, chemistry, and microbiology.

Safe -- closed system.

Would accommodate the disposal of liquid residues through a thermo-injector mechanism.

Schedule

Blueprints and design

- Major components
  - Shredder
    - Power units and drives feed other components
    - Feed (input and discharge)
  - Thermal decontaminator
    - Power units
    - Combustion fuel
    - Combustion air and air separators for primary combustion, air from shredder and supply for incineration scrubbers and after-burners
    - Feed (input and discharge)
  - Platform
  - Prime mover

Monitoring devices; equipment; and instruments

Prototype fabrication

- Develop costs, handling characteristics, and special handling
- Over-the-road specifications

Pilot plant

Prototype testing

Statistics and logistics

- Number of containers by state, region, and nation
- Market studies for disposal of end products
- Market studies for disposal of by-products (plugs, waste hydrocarbons, etc.)

Economic study

Develop national and regional plans for implementing disposal programs

Develop organizational structure for fabrication of units

Special Problems Requiring Research

Disposal of ash and other physical debris

Noise pollution

Special political problems, such as political subdivision laws and regulations relating to air, soil, and water quality standards

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James T. Conner is the Washington (D.C.) Representative of Chemagro, Division of Baychem Corporation. He graduated from Mississippi State University, worked for USDA Bureau of Entomology and Plant Quarantine, was an extension entomologist in North Carolina, and was most recently Director of Congressional Liaison for the National Agricultural Chemicals Association.

A CASE FOR REFILLABLE PESTICIDE CONTAINERS

by

D. L. Worf and Tayler H. Bingham
EPA and Research Triangle Institute, respectively
Research Triangle Park, N.C.

In 1967 purchases of pesticides by farmers required an estimate of 134 million pesticide containers of all types.* In addition, the use of large amounts of pesticides for commercial applications, householders, industry, and by Federal, State and local agencies constitutes the presence of a substantial but unknown additional quality. When these containers are emptied they present a potential hazard to people, animals, and plant life, because they frequently contain toxic residues of pesticides. Contaminated containers can be hazardous if they are converted for such uses as barbeque pits, feed and water troughs or floats; if they are improperly disposed of; or if they are readily accessible to children. The preferred current disposal method is incineration and/or burial, although this may also be hazardous.

One problem associated with disposal is that commercial incinerators of the proper design for air pollution control are costly to build and maintain, and are not usually available at convenient locations to farms. Open burning can cause objectionable odors or toxic gases to be given off. Second, acceptable sanitary landfills for discarding the empty pesticide containers are not always available. Burial without preincineration creates surface or groundwater pollution due to soil type or drainage patterns. Even with incineration some pesticides may remain to cause pollution.

A means for reducing the likelihood of environmental contamination from pesticide containers which are or can be reusable is to provide incentives for encouraging their reuse.

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*L.C. Gibbs. 1970. Chapter I. Disposal and Handling of Surplus Pesticides and Empty Containers. In: Information Available on Disposal and Handling Surplus Pesticides, Empty Containers and Emergency Situations. Working Group on Pesticides PB 197 146: page 1.

There is currently reuse of 17 gauge C, E and H 55-gallon steel drums by the drum reconditioning industry. These reconditioned drums are approved for general use other than Class "B" poisons.* An industry spokesman estimates that 45 million drums are refurbished and reused annually. This estimate is for all drums, however, and not just those originally used for shipping pesticides. However, cooperage firms typically prefer used drums be no more than six months old and may require a load of 200 drums before it is economical to collect them. At present they primarily buy 55-gallon used steel drums.

Furthermore, as in other packages, the trend appears to be toward the single trip container, for without reuse, such a container is usually the most economical package to consumers. It appears, that without intervention, the level of pesticide container reuse could well decline in the future. Such an outcome would place even greater burdens on an already inadequate disposal system and increase the hazards associated with empty pesticide containers.

Appropriate application of new technology in the container design and materials, use of economic incentives, and the institution of new management techniques for collecting and refilling pesticide containers could encourage the larger scale reuse of pesticide containers.

Technology

Design and development of an array of containers suitable for repeated refills and capable of withstanding severe handling and transportation stresses are needed.

Metal, plastic, rubber and glass appear to be promising materials.

Cost, impact resistance, low permeability, inertness to contents and to the external environment are needed characteristics. Use of composites of the above materials and protective liners and coatings are variables to be considered in developing long life into refillable containers. Design of containers to discourage misuse and to assure safe and complete drainage of liquid contents is essential.

Management Considerations

If the pesticide suppliers participate to a greater extent in the collection and reuse of empty pesticide containers, then they may wish to reconsider their

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*See speech by M. Hershson, these proceedings, Ed.

distribution system. One approach may be to decentralize the refilling operation by providing container collection and refilling stations on a regional basis in order to reduce the average trip length and, therefore, transportation costs for each container. Such stations could be operated by an individual firm or by an association of individual suppliers. Chart #1 suggests how this may be managed.

A modification of the above that could be found even more desirable for large users of pesticides is to have the refillable containers located permanently at or near the site of use. Bulk delivery could be made in a manner similar to that now used for refilling propane tanks. Adoption of this procedure would make collection and transportation of empty containers unnecessary.

Economic Considerations

Two economic alternatives exist which would encourage a larger scale of reuse of pesticide containers. These are deposits or refundable taxes on reusable pesticide containers.

A deposit could be required on pesticide containers. These deposits, initially imposed by the pesticide manufacturers, would be passed along to distributors and consumers. The consumer, after emptying the container, would return the container to the manufacturer and collect his deposit. The manufacturer will find it most profitable to use containers which can be reused several times since the cost per filling of this stronger container is typically substantially less than the cost of the lighter containers. As is the case in the soft drink industry, when refillable bottles are used, the same distribution system that is used to distribute the filled containers to consumers could be used to channel the containers back to manufacturers.

The second alternative would be a refundable tax imposed on the new container at the time of filling. This tax would initially be paid by the pesticide manufacturer who can be expected to pass it on to consumers. The tax would be refunded to any organization which demonstrated that it had reused the container. A refundable tax is, therefore, a more flexible mechanism than a deposit. The organization reusing the container could use the tax rebate as a basis for providing an additional incentive to consumers to return the empty pesticide container for reuse.

The deposit or tax would have to be set high enough to provide consumers with a significant incentive for returning the empty containers rather than converting them to other uses or discarding them in the most convenient manner.

The economics of increased pesticide container reuse appear favorable. However, the widespread geographic dispersion of containers and the fact that only a small share of all pesticide containers, i.e., 55-gallon drums, are currently reusable, probably curtail cooperage and farmer participation. For example, currently 17 and 18 gauge 55-gallon steel drums cost about $8.00 each and can be reused 10 to 15 times, or about $0.64 per filling. Added to this cost is transportation, inspection, cleaning, testing of the returned drum costing an estimated $6.00 per filling. Total costs are, therefore, $6.64 per drum. Compare to this the cost of $6.00 for the lighter 24-gauge drum designed for a single trip.

These costs, however, do not include the costs to farmers of the disposal of the empty drums, nor the costs to society when these drums are improperly disposed of and cause damage to people, animals, or plant life. One researcher estimates the labor, equipment and land costs associated with the disposal at 15 percent of the sales value* of the pesticide used or for 55-gallon drums about $15.00 per drum assuming that a 200-pound drum of pesticide cost $.50 per pound. The costs for smaller containers would, however, be significantly less.

The costs to society, however, of the improper disposal of these containers have not been estimated.

The economics of increased reuse of pesticide containers appear to be favorable given a sufficient incentive for farmers to return containers for refilling. Either deposits or refundable taxes may be able to provide this incentive. If greater reuse of pesticide containers could be achieved, it appears that several benefits could result. Among the most important are:

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*L.L. Jansen. "Estimates of Container Numbers by Size, Type and Formulations Involved," National Working Conference on Pesticide Disposal. Subcommittee on Pesticides, President's Cabinet Committee on the Environment. p. 35. June 30 and July 1, 1970.

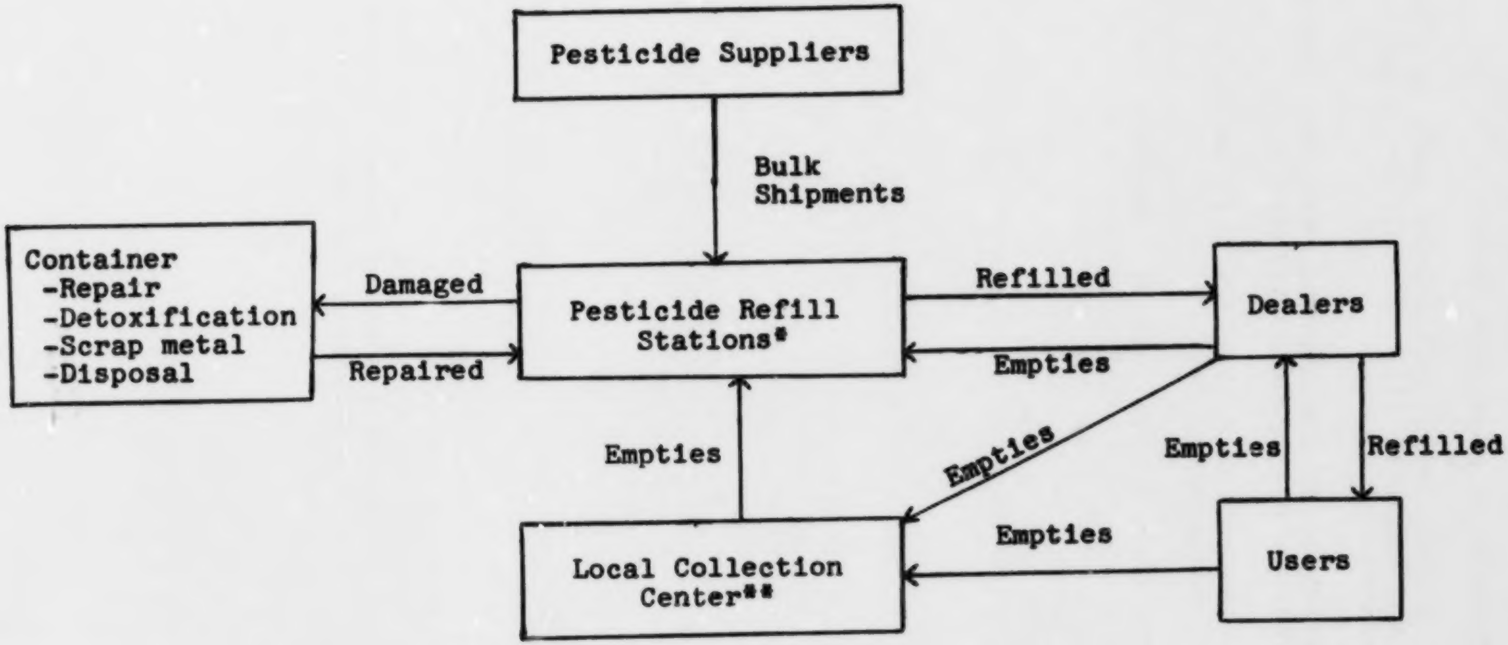
1. Lower costs to pesticide users.
2. Reduced solid waste management costs and reduced need for disposal sites for discarded pesticide containers.
3. Conservation of the natural resources needed to manufacture pesticide containers.
4. Reduction in the probability of damage to human, animal and plant life.

In summary, with optimal use of presently available container technology, providing economic incentives for returning empty containers, and instituting a management system for collecting and refilling empty pesticide containers, the present trend toward the use of disposal containers with their attendant hazards to man and his environment can be reversed.

Douglas Worf is assigned to the Office of the Director, National Environmental Research Center, U.S. Environmental Protection Agency, Research Triangle Park, Raleigh, North Carolina. His training at the University of Toledo was in chemical engineering, and he received a Ph.D. in chemistry from Georgetown University, Washington, D. C. His professional experience has been primarily in material research and health physics, and since 1946, has been principally in environmental research programs with AEC, DHEW, and EPA.

Tayler H. Bingham has for the past four years been an economist with the Research Triangle Institute at Raleigh, North Carolina. He is involved in work on environmental problems, and the use of economic insensitives for environmental quality management. He recently completed a study of the beverage container problem and a study on a national tax on sulfur emissions. He holds a masters degree in economics from the University of Connecticut, and has since worked also as a management consultant.

A POSSIBLE PESTICIDE CONTAINER REFILLING SYSTEM


Pesticide Suppliers
Bulk Shipments
Container
-Repair
-Detoxification
-Scrap metal
-Disposal
Damaged
Repaired
Pesticide Refill Stations*
Refilled
Empties
Dealers
Empties
Empties
Refilled
Empties
Local Collection Center**
Empties
Users

*Estimate 8-10 in U. S.

**Each county or as needed.

CONFERENCE PANEL DISCUSSIONS AND RECOMMENDATIONS

Assessment of the needs or problems in the use of various kinds of pesticide containers, and formulation of suggestions and recommendations for research, regulations, improved information dispersal, and alternative approaches to help solve the problems and fulfill the needs.

PANEL NO. 1: STEEL DRUMS

SEGMENT NO. 1

A. Problems discussed and possible solutions offered:

1. Proper emptying and rinsing

   Solutions - a. Rinse in accordance with present recognized or prescribed methods (NACA or WACA Method)

   b. Jet rinse - a system presently available and in use on existing equipment used by professional applicators

2. Transportation of empty used containers

   Solutions - a. Treat or handle all drums equally - in the same manner as though filled or empty (seal drums prior to shipment)

   b. Ship only in enclosed (van-type) trucks or trailers.

3. Return for reconditioning or recycling

   Solution - institute deposit-return system. (Deposit must be sufficiently large to assure return and equally applied by all concerned.)

B. Questions - as possible solutions to problems:

1. Is color coding of drums feasible as to toxicity of product contained?

2. Should all large and/or professional applicators be certified or licensed to handle restricted and/or general use pesticides?

3. Can safety levels be determined and/or established on pesticide containers after having been subjected to aforementioned rinse procedures?

4. Is it feasible to use the container (drum) as an integral part of the spraying or dispensing system?

5. Can drums be economically redesigned to allow for more complete drainage, and more importantly, is redesigning desirable and/or required?

C. Suggestions - as possible solutions to problems:

1. Explore further the possible use of bulk delivery and/or use of bulk (500 gal. and over) containers where applicable.
2. Consider the approach discussed by Chemagro on disposal.
3. Determine amounts of residual of all pesticides considered safe to remain in the drum to be disposed of whether by shredding, burial or reconditioning.
4. Change or amend existing DOT or government regulations to allow for use of lighter gage steel on drums where shredding or burial may be the most desirable means of disposal.

D. Conclusions: We have a Problem!

But --- before final solutions can be determined and/or implemented, the following UNKNOWNS must be given careful consideration.

1. What is the amount of potentially hazardous drums presently in the stream of the solid waste system?
2. How many drums of highly toxic or restricted pesticides are filled and shipped throughout the system?
3. What is the magnitude of personal injury or harm to the environment resulting from improper handling or disposal of these drums?

It seems that at the present time, we are proceeding with passing and enforcing even more stringent regulations without having sufficient knowledge of the total problem nor the magnitude of harm to the person or his environment.

PANEL NO. 1 - SEGMENT NO. 2

1. Discussed in depth the concept of 30 and 55 gallon drum disposal by the rinse, drain, and reconditioning route, including deheading, burning, and blasting. Generally agreed that this could be an acceptable procedure, but only with an adequate and stringent inspection and monitoring control. There will be areas of particular difficulty such as:

   a. Incomplete draining of drums

   b. Performing proper rinsing procedures

   c. Developing efficient collection facilities

   d. Controlling marketing of reconditioned pesticide drums

2. As a means of effectively controlling the handling and disposal of used 30 and 55 gallon pesticide drums, assuming that satisfactory disposal procedures have been developed and adopted, require mandatory adherance to such procedures as part of the operator licensing requirement under public law 92-516, with revocation of license one of the penalties (there may be others) for failure to adhere to disposal procedures.

3. Recommend a new industry study of expanded use of returnable (reusable) containers with emphasis on:

   a. Areas of controllable use

   b. Proper preparation of drum for return to filler

   c. Inspection procedures

   d. Determining effect on linings

   e. Eventual disposal of drum

4. EPA establish acceptable levels of pesticide residue in empty containers for safe handling in the following methods of disposal:

   a. Approved dump site

   b. For sale to EPA-approved drum reconditioners

   c. For crushing and recycling as scrap

These standards will permit the manufacturer of pesticide products to determine for each product the rinse requirements for each method of disposal.

5. Once safe and adequate procedures for drum disposal have been developed and adopted, require that label copy for each pesticide submitted for registration include directions which clearly reflect such procedures.

PANEL NO. 1 - SEGMENT NO. 3

1. Need for drum suited for pesticides.
2. Cost is too great to improve present standard drum.
3. How can we get empty drum from farmer?
4. Possibility of collection point for drums.
5. Deposits and returns - would not be effective.
6. Education:
    a. Farmer should be educated as to what should be done with empty containers.
        1. Rinse and drain process
        2. Money for drums returned
    b. Educate young people that will be using product in future.
7. Certified applicators could be held responsible for rinse and drain process.
8. Embossed drums for pesticides
9. New liners -
   possibility of non-wettable liners
10. Recommend that safety engineers of chemical manufacturers, drum manufacturers, reconditioners, DOT officials, and farmers or farm organizations combine their efforts toward possible solution of problems.
11. Possibility of scrapping all pesticide drums.

PANEL NO. 2: GLASS CONTAINERS

The problems were defined as breakage, design, closures, labeling, disposal, and public unawareness of hazard associated with use.

Possible solutions to these problems are:

1. Breakage	a. Use of protective coated or tempered glass container
	b. Improved secondary packaging
	c. Consideration of optimum size bottle less likely to break
	d. Non-use for pesticides of restricted nature
2. Design	A more compact bottle less likely to tip
3. Closures	a. Use of closures less likely to leak
	b. Use of closures that would be childproof
4. Labeling	Use of a common symbol identifying a pesticide bottle
5. Disposal	Education of public in accepted method of disposal
6. Public Unawareness	Education of public in hazards associated with use and storage

Conclusions

Research Needs	a. In container design and closures that would be compatible with manufacturer, shipper, and user. This would be a government-industry project.
	b. In means of collecting and cleaning glass containers for recycling.

c. Educational programs by industry-government, teaching safe use of bottled pesticides.

The consensus of the panel was that no additional regulation is needed at present.

The problems associated with glass are not unique and are common to other pesticide containers.

PANEL NO. 3: FIBRE DRUMS

A. Problem Definition:

1. Are there inherent problems with fibre drums used with pesticides?

2. Can fibre drums with pesticide residues be disposed of safely?

B. Considerations:

1. Fibre drums are primarily used for dry or solid form pesticides, authorized for Class B Poison solids, n.o.s. and other products listed by name in Federal Code of Regulations.

2. Fibre drums and composite fibre-polyethylene drums are not presently authorized by DOT regulations for Class B Poison liquids.

C. Summary of Problem Review

Fibre drums for pesticide use should:

1. Permit 100% emptying of contents.

   Lightweight fibre drums can be emptied of contents.

   Full open top construction permits examination after inverting and tapping to remove final contents.

2. Be constructed to withstand rough handling.

   Fibre drums having full removable covers, secured with metal locking bands or with telescoping fibre covers, secured by application of appropriate tape, are available to withstand rough handling abuse.

   In addition, fibre drums are available that will resist humid storage and outdoor exposure.

3. Provide closures which are sift-proof and leak-proof.

   Fibre drums are available with appropriate sealant features to prevent sifting or leakage of contents.

4. Provide for easy identification of contents.

   Body and cover surfaces can be labeled, printed and decorated with multicolor designs.

5. Provide for re-use or recycling.

   Fibre drums are primarily offered as single trip containers and are easily disposed of by controlled incineration or burial, having bio-degradable components.

   The components of fibre drums can be reclaimed for recycling.

   Once used pesticide fibre drums may be attractive for secondary uses, and care should be exercised to destroy drums in a controlled manner so as to avoid possible health or environmental pollution.

D. Conclusions:

Based on the data presented at the Conference, there are no inherent problems with fibre drums used for pesticides, and emptied drums can be disposed of in a safe manner.

PANEL NO. 4: PLASTIC CONTAINERS

1. The Plastic Bottle Committee of the Society of Plastic Industries should be approached to determine whether standards exist and, if not, be requested to develop standards that can be adopted for plastic containers and closures mechanically and chemically compatible. These standards should relate primarily to containers for the pesticide industry.

2. Permeation of plastics is a serious problem with respect to many pesticides. Industry has research underway and acceptable solutions are on the horizon.

3. Additional pesticide user education on rinse, drain and disposal procedures is needed.

PANEL NO. 5: PAPER & CARDBOARD CONTAINERS

A. Specific Recommendation

Guidelines be established for transportation of less-than-palletizable quantities of pesticides, such as 5, 10, or 50 bags in a truck.

B. General Recommendations

1. Research on designs of closures for containers of products destined for household storage or use, to reduce household accidents and make the products more childproof.
2. Reduce the extent of packaging attractiveness; make the products look less attractive to the users.
3. The size of the warning or caution label should be relative to the size of the container of the product.
4. Broaden the Class B poison definition to include more kinds of products, particularly the more hazardous agricultural chemical products.

C. General Comment

The disposal problem for agricultural pesticide containers is recognized as not being as difficult for paper and cardboard as for metal containers.

Attachment 1

PANEL NO. 5: PANEL DISCUSSION NOTES

To illustrate the extent of exploration of problems at this panel session, exerpts from the notes of panel participant Stanley Gilmore (Federal Trade Commission) are included. -- Editor.

While the deliberations of the Panel were centered on the subject matter of the conference agenda, discussions ranged over the breadth of experience and expertise of the Panel participants.

Time was a limiting factor in exploring needs and in formulating comprehensive recommendations with respect to paper and cardboard containers. Thus, the Panel's spontaneous discussions encompassed some but not all of the advantages and limitations of paper and cardboard versus alternative types of containers. Much of the group discussion dealt with problems common in some degree to all pesticides containers in transportation, labeling, and disposal.

Various individual recommendations or suggestions were made by participants during the Panel discussions. Time limitations and some change in the Panel make-up during the two separate Panel sessions precluded full consideration on all suggestions in the Panel's final recommendations. Following are some of the problem areas discussed by the Panel participants:

A. Transportation:

   1. Problems of transporting and handling pesticides in paper and cardboard:

      a. Breakage, spillage, and damage:

         - problems are more frequent and troublesome with odd-lot, or less-than-carload (LCL), non-palletized shipments.

      b. Damaged or spilled pesticides:

         - sometimes not readily recognized by workers as hazardous chemicals requiring special precautions, treatment, or care.

      c. Bulk cargoes of pesticide chemicals

         - potential hazards may not be apparent to workers, transporters, or handlers.

d. Adequate labeling and identification of pesticide shipments

  - essential for safe handling and transportation

2. Solutions to problems suggested or discussed by Panel participants:

   a. To minimize breakage, spillage, and damage:

      - government should prevent the shipping of loose bags of pesticides. (Discussion did not confirm this as a practical course because of continued need for small shipments.)

      - a method of palletization is needed for all pesticide shipments in paper bags. (Problems of small lot shipments consisting of a bag or two were discussed and not resolved).

      - a regulation requiring heavier paper is needed for pesticide shipping bags.

      - Federal Government should have recommendations on packaging

        - specifications and standards should be reviewed to determine if they are suitable or satisfactory for particular uses.

        - recommendations for package standards should consider product density as well as package size.

        - guidelines for minimum standards may have to be formulated on basis of (1) class of poison or pesticide, (2) size of package (3) density of product.

      - review paper containers now in use for adequacy and suitability for specific uses.

      - require palletization of paper bags for shipment of Class B poisons.

        - creates problem of cost and return of pallets.

        - cardboard pallets are available at about $4.00 each or about $6.00 strapped.

    - shrink-wrapping of pallet loads could reduce transportation and handling damage and hazards.
    - pallet boxes are available.
    - pallets reduce breakage costs.
- presently available technology can resolve many of the problems with paper containers.
    - technology is available for most packaging and closure problems.
    - cost is a factor.
    - price competition results in a minimum satisfactory bag.
    - plastic and foil multilayer paper bags can be supplied to meet severe use specifications.
    - price is a factor in supplying an improved container to meet certain needs.

B. Labeling and Identification of Pesticides - comments were generally applicable to all types of pesticides packaging and not necessarily confined to paper and cardboard.

1. Transportation:

- in shipping pesticides, the trade name of the product should appear on the freight bill for ready identification in event of an accident.
- bulk shipments - a complete product label for the product should accompany the shipment.
- shipments of pesticides are not easily recognized as hazardous materials by transportation workers and handlers.
- specific information on product identity is necessary in requesting emergency aid.
- to minimize hazards and to promote care in handling pesticide shipments, all pesticide containers.

    - should be clearly and plainly labeled (in addition to other required labeling which may be on a tag or small label) with the easily understood statement:

      "THIS PACKAGE CONTAINS A DANGEROUS PESTICIDE"

    - the above statement should be included on the container by the manufacturer so it would be visible to all persons storing, shipping, handling, or using the product.

  - a product and hazard identification system is necessary and should be required.

    - Department of Transportation is working on such a system.

    - Federal Standard 313 has previously been proposed but apparently has limitations and would conflict with DOT requirements.

    - early resolution of this problem is essential for safety in transporting and handling pesticides and other hazardous materials.

    - labels should be durable and legible.

C. Home Use Pesticides Packaged in Paper and Cardboard:

- may not be satisfactory for Class B poisons.

- must prevent against puncture, snags, moisture, etc.

- plastic is not a suitable substitute unless adequately strong. (Some plastic bags now on the market can be punctured with user's finger).

- requirements of Poison Prevention Packaging Act may limit household pesticides in paper to single dosage units unless suitable childproof packages and closures can be developed to meet requirements that package has to be reclosable if not used in total as a single use unit.

- labeling and package design should be distinctive and not easily confused with food packages.

- labeling and graphics on packages should not be attractive to children and should be durable and legible.

- educational programs in the environmental area and especially household pesticide hazards should be directed toward children. (The State of North Carolina's educational program on household fire hazards was cited as an example of an effective educational effort that could easily be applied to pesticide hazards.)

- consumer sized packages should have a measuring spoon or dispenser included to aid in providing proper dosage and to prevent use and contamination of household spoons, etc.

- labeling for Class B poisons should be reviewed and made more effective from standpoint of warnings, precautions, disposal information, etc.

D. Disposal of Paper and Cardboard Containers:

- paper and cardboard have advantages over various other types of containers:
  - are biodegradable if buried.
  - can be burned.
  - therefore disposal is simpler, providing local, State, and Federal regulations allow such disposal.

- foil and plastic laminated paper bags cannot be considered to be biodegradable.

- completeness of emptying containers to minimize the pesticide residual in the "empty" container is a prime factor in the disposal problem.

- bags may require special care in emptying to remove residual pesticide product from seams and folds.

- excessive and vigorous shaking may increase air contamination in working area and thus increase occupational hazard.

- bag design and plastic lining can minimize seams and folds at an added cost factor.

- water soluble bags may have promise in certain uses but are still in developmental stages.

- instructions for package disposal should be included in pesticide package labeling
  - the question of what instructions are needed was not resolved.
  - disposal recommendations should be set by EPA to unify disposal procedures.
  - it was questioned whether the Federal Government can regulate disposal conditions in all parts of the country.
- reference to local requirements may be meaningless where local or State jurisdictions have not formulated disposal guidelines.
- disposal guidelines to protect air and water quality are essential.
- problems will still exist where farmers continue to bury or burn containers on their own property regardless of guidelines.

PANEL NO. 6: PRESSURIZED CANS AND SPECIALIZED DEVICES

A. SCOPE:

The discussions focused almost entirely on:

1. Consumer applications as household products rather than an agricultural usage, since the vast majority of the containers falling in this category are of a size not designed for broad usage in agricultural or industrial applications.

2. Use by the military (a) in combat areas which the Panel recommended be considered as a special problem and not a subject for a controlled regulation or to be researched within the scope of the conference; (b) of standard commercial products in personnel quarters, etc., as distributed by the PX, commissaries and similar outlets, which should be viewed just as a standard consumer household product.

B. PRESSURIZED CANS FOR PACKAGING PESTICIDES

Pressurized can packaging was interpreted to apply to the packaging of pesticides with a true aerosol propellent or other form of gas pressure that would dispense the pesticide from the container as a spray with various degrees of atomization and spray particle size for either space or residual coverage.

1. Pressure Hazards

The problems related to the container centered around the hazards of explosion due to excessive temperatures, particularly in incineration, and as related to the overall disposal problem.

Participants in the Panel agreed that isolated cases have been reported to bodily injury or property damage from disintegrating pressurized containers. They were not aware of any record of incidents that would justify recommending a change in the construction of cans currently in use.

It was suggested that a safety valve-type device on the can might minimize the problem of explosion during incineration. A can manufacturer's representative advised that this type of device was not considered by industry to be practicably attainable. However, modification in the construction of the can dome has been achieved. This involves radially scoring the metal to provide for rupturing the dome at some pressure which would preclude the "missile" effect if the can did explode during incineration.

Recommendations

Present requirements for labeling of pesticide containers provide adequate warnings in regard to pressure hazards. No further regulations are necessary.

Hazards from pressure appear to be related principally to disposal of the used pesticide containers. Since the number of pressurized cans used in packaging pesticides constitutes a relatively small percentage of the total number of pressurized cans requiring disposal, the panel recommended that this subject may be more properly evaluated and acted upon by people in the field of solid waste disposal.

2. Health Hazards

Much of the discussion was directed toward the availability of suitable aerosol valves that might permit use-control through (1) metered dosings and (2) standardized spray patterns while still attaining desired particle sizes for specific needs. It was pointed out that household pesticides dispensed from a pressurized can do not constitute a health hazard through ingestion. The health hazard, if any, was considered to come primarily from inhalation of the atomized product, but also from dermal contact.

The standardization of particle size in the atomization of pesticides would help to minimize potential physiological mal-effects owing to inhalation. It was also felt a suitable particle size range could be established as a standard which would not detract from the effectiveness of the substance as a space spary. Before any such standardization could be implemented, it was recognized that a standard method of determining the particle size in the spray would have to be established.

It was suggested that some form of a metering valve might be used on pressurized cans to prevent overuse of the pesticide when used as a space spray. It was felt by one manufacturer that a metered dose valve would not be required to control sprays intended for use on surfaces. A pesticide manufacturer with some experience in this matter stated that standard aerosol valves and buttons now in existence could probably provide the desired features, though their use might involve some additional costs.

Recommendations

It was suggested that CSMA or the Aerosol Valve Manufacturing Group be contacted to provide guidance in determining the practicality and economic feasibility of particle size standardization and metered dose standardization.

3. Environmental Hazards:

The residual material in pressurized cans that have been "emptied" was not considered to provide significant environmental hazards.

4. General:

Other discussion ranged from container structure design leading to reported problems such as seal deterioration reducing storage time and permitting escape of contents, accidental activation of trigger mechanisms on exposed-top containers, wetting of fingers by spray-back from push button orifices, to concern about container look-alikes and trade name similarities causing injury through accidental misuse.

Recommendations

The Panel could not identify individual matters of a severity or frequency which would warrant specific action. However, it felt, the "general" problems indicated a trend and suggested device data from both effectiveness and safety standpoints should be required by EPA as part of pesticide registration procedures.

5. Poison Prevention Packaging Act

Some of the Panel members felt that consideration should be given to declaring by regulation all household pesticides packaged in pressurized cans as substances requiring "special packaging" under this statute. It was recognized that the toxicity levels specified in the Proposed Child Protection Packaging Standards for Economic Poisons might not encompass all pressurized packages of household pesticides. A general endorsement of child-safe packaging for all pressurized containers was offered by the Panel.

C. SPECIALIZED DEVICES

Specialized device packages discussed included trombone dusters, shaker cans, and articles such as impregnated wax bars and water soluble pills wherein the pesticide is essentially self-contained. Some of the Panel members felt pesticides contained like these are inappropriate for home and garden use as there is inadequate control over the quantity dispensed as well as poor security during storage of the partially used product.

Another specialized device is the finger-tip sprayer, which is used on consumer packages of liquid pesticides normally used as a surface spray. For articles that require limiting availability, the sponsor of the product felt that the finger-tip sprayer, would in itself provide for child safety in that the amount of material which a child could get out of the bottle through the sprayer would theoretically not be a problem. The sprayer discharges only in the neighborhood of 0.5 to 0.7 ml. with actuation.

The sprayer, permanently affixed to the bottle, could be equipped with a child-resistant overcap as a further step towards child protection if absolutely necessary. If this route is elected, it will take approximately one year to provide for plastic tooling and special equipment. Thus the industry could not expect to find a sufficient supply of sprayers made in the child-resistant design prior to the 1974 filling season.

One manufacturer has a child-resistant finger-tip sprayer in prototype but even with this degree of anticipation, the most favorable outlook for volume production would be some time in 1974.

Recommendations

Due at least in part to the limitations on time for Panel deliberations, no specific recommendations resulted from this phase of the workshop session.

PANEL NO. 7: TANK CARS AND TANK TRUCKS

A. Panel discussions revolved around the possible methods of shipping pesticides in bulk. It was evident that there is a specific need for bulk movement of formulated goods from the formulator to the applicators. Several points were noted in the discussions which involved members from basic industry, formulators, and various government agencies all concerned with the safe handling and transportation of pesticides. Some major points noted are as follows:

1. A definite need exists for bulk movements of pesticides. This is conservatively estimated at 50% of pesticide volume of formulated goods from the formulator to the applicator. (Applicators for the discussion could be either aerial applicators or the farmer).
2. Human handling could be minimized by bulk shipments from formulator to applicator.
3. The number of individual pesticide containers could be reduced to a reasonable number that could be safely handled and disposed of.
4. Safety in bulk movement should be a prime consideration because of less handling - cut down the number of areas where hazard to human health is a factor, i.e., drum filling, emptying, cleaning, disposal, etc.

B. Since a need for bulk movement appeared necessary, discussions of various methods of bulk movement were noted.

1. Tank car movements of pesticides to formulators is already a reality.
2. Methyl parathion can be shipped according to D.O.T. container specification 105.A covering tank cars.
3. Intermodal tank specifications will be published by the Coast Guard (IM 100; IM 101) covering bulk shipments in specially designed tank containers for export, may be applicable to pesticide movements from formulators to applicators.
4. Tote bins or tote tanks (200 - 500 gallon capacity) may be suitable bulk containers.

5. Collapsible rubber containers similar to UNIROYAL's presentation may possibly be developed resistant to solvents used in agricultural formulations.

6. Cleaning procedures used in the dairy industry may lend themselves to the effective cleaning of bulk pesticide containers.

C. CONCLUSION

In view of the discussions in the Panel, we feel there is a definite need to have bulk movements of formulated pesticides direct from "a formulator to an applicator."

We feel that if a suitable bulk container existed for a hazardous "Class B poison" such as methyl parathion, then we might be able to develop a suitable bulk container for formulated pesticides containing this type of "Class B poison" for shipment direct from "formulators to applicators".

Precedent has been established for the bulk movement of methyl parathion and methyl parathion mixtures in tank cars meeting DOT container spec. 105.A. We feel that a bulk container conforming to DOT container spec. 105.A can be extended to cover movement of bulk tanks via motor carrier of formulated goods from the "formulator to the applicator".

This would be of benefit to the environment as well as a plus safety factor in that many, many containers would be eliminated. The disposal problem with drums would be lessened. We know that the more handling necessary in pesticides, the greater the risk to man and his environment. By going to bulk, we increase the safety in use of needed pesticides. This would be of significant benefit to the environment in eliminating a large majority of the pesticide containers now needing disposal.

D. RECOMMENDATION

We recommend that the agricultural chemical group in full cooperation with the various Federal agencies concerned with the safe handling of pesticides consider that a special permit (under Title 49 170.13), for the bulk movement of various sized containers via motor carrier, be established in time for the 1973 growing season. A petition to the D.O.T. for assignment of a transportation code for tank truck, bulk container, shipments of formulated pesticides should be initiated.

PANEL NO. 8: ONE TO FIVE GALLON STEEL CONTAINERS

The Panel defined its problem as follows:

Current methods of hazardous material distribution and container disposal may constitute a danger to both human health and to the environment.

As the Panel sees the problem, there are two major areas of concern. One major area is that of container leakage; the other area is disposal of the containers after they have been used by the consumer.

A. CONTAINER DISPOSAL

It was the Panel's opinion that the disposal of the emptied container presents by far the largest problem currently facing the industry. Recommendations concerning the disposal of the containers are as follows:

1. In our opinion the best possible disposal system for properly emptied pesticide containers would be to allow the end user to bury the container on the land where the pesticide is applied.

2. If this is not feasible, the end user should then be allowed to transport the properly emptied container to an approved sanitary landfill. This landfill would be operated under the auspices of the EPA. Disposal should be made on a designated collection day so that the landfill operator could be alerted to the fact that a hazardous material was being handled.

3. Should "1." and "2." prove unworkable or undesirable, our recommendation would be as follows:

   The end user should be educated to reseal and return the properly emptied containers to his point of purchase. This would in effect reconcentrate the containers and would allow the implementation of a recycling program such as that presented by Chemagro.

4. It is the Panel's feeling that, regardless of the method of disposal adopted, the real key to the program is education. The Agricultural Extension Service's current education program relating to the disposal of containers, should be re-emphasized and

extended. Emphasis should be placed on educating the distributor of the products; he should not only be educated as to the facts regarding handling of the material but also should be educated in methods of passing this information to the end user.

B. CONTAINER LEAKAGE

It is the Panel's opinion that leakage of containers should be considered in two groups:

leakage due to manufacturing defects, and
leakage due to transportation and handling.

1. Manufacturing defects:

It was the consensus of all present that advances made by container manufacturers in the past few years have substantially increased the quality of the steel containers currently being used and that leakage due to manufacturing defects is not currently a problem. It is our recommendation that consideration be given to extending the DOT Specification to include linings permissible for packaging hazardous materials.

2. Transportation and handling problems:

It is the Panel's recommendation that the transportation industry be asked to redouble their efforts to educate their personnel in proper handling techniques for Class B and other hazardous materials. Full use should be made of training aids made available by organizations such as NACA. It is also our recommendation that the transportation industry be required to provide the industry with such currently available equipment as cushioned underframed box cars, etc.

C. General

It was the consensus of the Panel that there is no evidence available which would allow a realistic evaluation of the leakage and accident problem. We would therefore suggest that reports of accidents and incidents of leakage be funneled into one collection point so that a formal data base may be compiled, evaluated and categorized. This could possibly be done by the pesticide industry working in conjunction with the government. The basic responsibility for furnishing this information should rest with the end user and with his direct supplier. (Editor's note: Reporting of accidents and instances of leakage of Class B poisons in interstate movement is already a requirement by DOT. For pesticides less toxic than Class B poisons, there is no requirement for reporting. But there is an EPA voluntary reporting system covering incidents and accidents for all pesticides.) (See speech by C. Mitchell, this conference)

As a final recommendation the Panel suggests that consideration be given to the development of a universal symbol which would indicate a hazardous material is or has been packaged in this container. This symbol would be incorporated in the package itself (embossed in the glass, printed in the lithograph design, etc.).

COMMENTS PROVIDED FOLLOWING THE CONFERENCE

Conference participants were invited to send comments and suggestions regarding the Conference and the subjects discussed therein, to be published as part of the Proceedings.

December 5, 1972

Dear Dr. Preston:

It was my pleasure to attend the National Conference on Pesticide Containers held November 28-30, 1972 at the Hotel Sheraton-Charles, New Orleans, La.

The conference was very well handled and it did an excellent job towards assessing the current problems related to Pesticide Containers and their corrections. It was gratifying to observe the genuine interest by everyone to discuss and analyze the Industrial problems, techniques and research between Governmental agencies and Industry.

This is the type of meeting that we need in order to clarify and implement the changes Government and Industry must make for environmental preservation.

The panel participation proved to be an excellent vehicle for Government-Consumer-Industry interchange of ideas. It was my privilege to be selected for the glass container panel. We are looking forward to receiving the publication of this panel as well as the other participating panels.

On behalf of Mr. J. P. Sullivan, our President, who was unable to attend the meeting, we thank you and the members of the Federal Working Group on Pest Management for your work in bringing about this type of meeting.

Please include our organization on your invitation list for future meetings. May we suggest that future meetings allocate more time to small package Garden-Lawn care resale products.

Sincerely yours,

J. H. Hunter
Retail Sales Administrator
Swift Agricultural Chemicals
Corporation

December 6, 1972

Dear Dr. Preston:

It was a pleasure to see you at the National Conference on Pesticide Containers. It was an excellent meeting. In this letter I wish to express my views on some of the subject matter of the meeting.

There was much said about our "problem" of container disposal; the "potential" for harm of empty pesticide containers, particularly metal containers of insecticides. I feel strongly that those expressing these concerns are not knowledgeable of the subject, but are speaking from a purely theoretical viewpoint.

I have been in Memphis in the agricultural chemicals business since 1946. From 1946 to now there have been hundreds of thousands of paper bags and metal containers from 1 to 55 gallons capacity used by Mid-South farmers. The containers have contained herbicides, fungicides, defoliants, and insecticides, including Class B poisons. The containers have been handled by whatever means those handling them have seen fit to employ.

Under these circumstances and over the period of time involved one might believe problems would have arisen, but they haven't. I do not know of people, wildlife, aquatic life, or the environment in general being adversely affected.

If people had been affected, such would have been widely publicized; but in fact people have not been poisoned or otherwise affected.

The Mid-South is a mecca for hunters and fishermen. We have quail, deer, turkeys, ducks, squirrels, rabbits, dove, bass, crappie, bream, catfish, etc. in abundance. In fact, recently, Mississippi had an open season on does, deer were so plentiful. The Mississippi quail season was extended in recent years. Wild turkeys are on the increase. Fishing is year-around.

Now if this is the situation after twenty-five years of usage of pesticides, then what is the problem? From a hazard standpoint there is none. When a pesticide is poured from a container probably only 0.1% to 0.25% of the pesticide remains in the container. And it should be remembered that the pesticide was designed to be dispersed over the environment. Therefore of what harm to the environment could that portion remaining in the container cause even if it did get out of the container? And obviously not all will. Experience proves they haven't.

Occasionally an "empty" container will be misused. as for instance, using an "empty" endrin container to mix livestock spray in. But this is not a container disposal problem.

I agree that stacks of empty containers along highways are an eye-sore, and for this reason, and this reason alone, I think they should be disposed of. But a hazard they are not.

We are, of course, vitally interested in human safety, protection of the environment, and prevention of litter. We feel these matters must be considered, as well as economics, in the conduct of our business. We therefore believe that movement of pesticides in bulk would be a help in achieving greater human safety and would certainly alleviate the drum disposal "problem." We would like to have a Department of Transportation standard developed for permissable equipment in order to transport by truck, bulk shipments of our formulated insecticides, including Class B poison. Shipments would be made between our formulating plants and bulk stations located at commercial applicator sites, such as air strips, and at large consumer sites. I shall approach the Transportation Committee of NACA regarding this and hope we may have the support of the Safety Panel of the FWGPM.

Again, I enjoyed the meeting and feel it was of value.

Yours very truly,

Robert C. Harnden
Director, Technical Services
Riverside Chemical Company

December 7, 1972

Dear Mr. Wymer:

I attended the recent National Conference on Pesticide Containers and found it to be very stimulating and informative. The relatively slow progress that has been made in the standardization of pesticide containers and closures and in their identification was somewhat of a surprise to me. The conference was very successful in bringing the problems to everyone's attention. I hope it will be equally successful in bringing about the needed changes. Some of my observations and comments are attached.

Sincerely yours,

J. B. Weber
Professor
North Carolina State University
at Raleigh

Comments Relating to the National Conference on Pesticide Containers

I. Regulations and Legislation

1. Many regulations appear to be originating from assorted, interlocking agencies. Compliance with some of the regulations is poor, and some of the regulations need to be reexamined.

2. The Special Packaging Idea (packages designed so that children under 5 cannot open them) is a good idea. Would it not be possible at the same time to require a standardized design which would make the containers immediately recognizable as a pesticide container and, in addition, to require a special identifying mark or symbol? For example, milk, soft-drink, and liquor come in uniquely shaped containers, and packages containing radioisotopes are marked with a special symbol. (More on this later).

II. Containers

1. The majority of pesticides are sold as liquids in 1 and 5 gallon lots or as solids in 5 and 50 lb. bags. Would it be feasible to require that a uniquely shaped container (rectangular-shaped pail or bag for example) be adopted for these 4 sizes? From the comments made in the Plastic Containers Panel it is unlikely that all containers could be standardized. Apparently there are quite a number of people involved in pesticide container design and they like their work.

2. The panel discussions were very informative but perhaps next time they could be organized according to the shape of the containers instead of the material from which they are made, e.g. bags, bottles, and drums instead of plastic, glass, and paper. The plastic panel spent considerable time on the problem of permeation. (The pesticide carrier or solvent passes through the plastic and causes the bottle to buckle). This problem might be easily solved by use of combination of plastic and metal or glass. Combinations of these materials might also make much better containers.

III. Labels and Identifying Marks

Every pesticide container should contain a special identifying symbol analogous to that used for marking radioisotope containers. The symbol should become standard and contain wording similar to the following: "Pesticide - Toxic, Do not Reuse This Container". It should also be made of plastic or some durable material which would not fall or wash off the container.

IV. Closures

The threads on the closures of at least the 1 and 5 gallon containers should be standardized.

V. Container Disposal

The pesticide containers in themselves pose no disposal problem. It is the small amount of pesticide that is left inside that poses the problem. Would it be feasible to attach to each pesticide container a small package of material which when added to the emptied container would decompose or inactivate the small amount of residue? A small package of a charcoal-soap solution mixture which could be added to the pesticide container after it is emptied would dissolve and inactivate pesticide residues. The charcoal-soap solution could be left inside the container when it is discarded.

December 11, 1972

I would like to enter my comments regarding pesticide containers in the proceedings of the conference. My thoughts come from the standpoint of a formulator of field strength chemicals being sold to dealers and farmers.

Steel containers in the sizes of 1, 5, 30 & 55 Gal.

Question: To have stronger and more expensive re-usable containers or have thin walled, cheap one-way containers?

Answer: As a formulator we strongly recommend that the industry continue with the one-way non-refillable container for many reasons. With a re-usable container you have all the problems of the one trip containers, (decontamination, transportation, etc.) plus many others, (cross contamination, drum safety, label mix-up, etc.)

Question: How to decontaminate container?

Answer: We feel that the three (3) rinse procedure will be adequate if done at time of emptying the contents. They replace the closures.

Question: What to do with empty rinsed container?

Answer: First the good 55 and 30 gallon containers should be returned to supplier by farmer for collection and shipment to a drum reconditioner. The damaged 55 and 30 gallon containers and all 5 gallon and 1 gallon containers should be taken to a government receiving point to be completely incinerated. We feel that land-fill disposal will prove to be expensive, hazardous and plain hard to find enough locations.

Question: How to get farmers to return the empty containers?

Answer: Set up a reasonable deposit by drum size. Say $5.00 for 1 and 5 gallons, $10.00 for 30 gallons and $15.00 for 55 gallons. The deposit would be repaid at point of return.

Question: How to get farmers to rinse containers?

Answer: Education. Get their money out of the bottom of the can. A law to require it, maybe a penalty.

Question: Is there a better method of getting the pesticide from the formulator to the farmers or aerial applicators than use of steel drums?

Answer: We feel that for the aerial applicators and the large farmers (which is 90% of volume in cotton), bulk shipment in approved tank trucks (Mc306 or Mc307) from the formulator to bulk storage tanks at the aerial applicator's site or large farms would eliminate the problem of the large drum and reduce the problem with 5 gallon pails.

Question: What about the hazard of hauling bulk pesticides on highways?

Answer: We feel that if hauled in approved (Mc306 or Mc307) tractor trailor units owned by the formulator or licensed commercial applicator, the hazard to the general public and environment would be much less than now with the drums, and certainly less than the hazard of gasoline, L.P. Gas, liquid nitrogin, etc. We think the delivery of bulk pesticides could be handled much like the delivery of bulk gasoline.

Paper Sacks and Fibre Drums

Question: How to dispose of same?

Answer: We feel that enforcing or getting the farmer to participate in a return of paper containers to any central collection point is going to be an impossible job. We favor allowing burning of paper containers at point of use, particularly herbicide containers that have low toxicity anyway. Even with burning insecticide containers, the amount of pesticide released into the air through burning is insignificant compared to what was released into the air through the application of the same insecticide.

We realize that the collection and disposal of pesticide containers is a complex problem. We further think that the whole question has been blown way out of proportion, with respect to the hazard of empty pesticide containers to people, livestock, and environment. A look at the record of the past fifteen years will certainly show this. I'm talking about farm field strength chemicals used on the farm by farmers or commercial applicators.

I see a much greater danger to people, especially children, from small package pesticides around the home in suburban areas. Collection and disposal from the housewife will be next to impossible, in my mind, but this is where the hazard to human life seems greatest.

Yours very truly,

W. Nic Dismukes
Manager, Chemical Division
Ring Around Products, Inc.

December 15, 1972

Dear Bill:

Congratulations again on the meeting in New Orleans. I think it served to bridge a tremendous communications gap. Apparently someone did an exceptional job in producing the attendance and participation from the various sectors represented at the meeting.

My only regret was that I was not able to make more of an input to the meeting. There probably was not a logical place to do so, but it might have been good to have informed the group of our progress in the area of disposal of waste pesticides and containers. I did meet with the panel on metal drums but there was not a great deal accomplished in those sessions.

Probably, you have already seen our publications and reports on the subject, but, in case you haven't, I am enclosing copies of a few of them. (See list next p. - Ed.)

The presentation of Jim Conner from Chemagro - It is a little difficult to believe that anyone was able to secure a patent on such a system, particularly since it is the same concept which we developed a number of years ago. In fact, I have shown similar sketches in various meetings at which we presented information on our pesticide disposal research.

I believe that I heard more favorable comments on the short presentation of Mr. Fernand Falgoust than on any of the others. His remarks were clear and to the point, and very aptly stated the position of the farmer.

I hope that the proceedings from the meeting will make it clear to everyone that potential hazards do exist with pesticide containers. Ignoring the problem of pesticide and container disposal is the reason for our present dilemma.

In general I think that it was a good meeting. Again, congratulations on a job well done, and thanks for inviting me to attend.

Sincerely yours,

Fred L. Shuman, Jr.
Associate Agricultural Engineer
Mississippi State University

References for publications on pesticide and container disposal included in Dr. Shuman's letter:

"Engineering aspects of the disposal of unused pesticides, pesticide wastes, and pesticide containers" F.L. Shuman, Jr., B.J. Stojanovic, and M.V. Kennedy. 1972. J. Environ. Quality 1 (1): 66-70.

"Analysis of decomposition products of pesticides." M.V. Kennedy, B.J. Stojanovic, and F.L. Shuman, Jr. 1972. J. Agric. & Food Chem. 20 (2): 341-343.

"Edaphic aspects of the disposal of unused pesticides, pesticide wastes, and pesticide containers." B.J. Stojanovic, M.V. Kennedy, and F.L. Shuman, Jr. 1972. J. Environ. Quality 1 (1): 54-62.

"Engineers active in six areas" William R. Fox. 1972. Mississippi Farm Research 35 (2) (December, 1972): 2-3.

"Safe disposal for pesticide containers." 1973. Agricultural Research 21 (8) (February, 1973): 8-9. (Added by Ed.)

December 19, 1972

Dear Mr. Wymer:

At the conclusion of the conference, you invited comments for possible inclusion in the proceedings. I will appreciate having the following comments considered.

1. Several problems were discussed as perceived by various individuals. The magnitude of those problems was really not documented at the conference. It seems axiomatic that the greatest effort on pesticide container problems should be directed to those segments posing the greatest hazards. To that end, documentation seems necessary.

2. Basing future actions or guidelines on the Pesticide Law enacted by Congress in 1972 should help minimize many definitions, training and labeling difficulties relative to container disposal. This was recommended by the steel drum panel I participated in. That recommendation appears particularly important to a practical way of minimizing container disposal problems by farmers and custom applicators.

3. References were made at the conference to a method for reducing solvent permeation of plastics. As promised, a summary is attached briefly describing some attributes of this procedure. Please note that the process is under development; it is not yet a commercial procedure.

4. Bringing together a group with widely diverse backgrounds with a common interest in pesticide containers resulted in a rapid education process for most. I feel that aspect alone made the conference worthwhile. As the level of knowledgeability increases, perhaps another selective conference would be in order to help firm up the more promising suggestions that are evolving.

Sincerely yours,

K. G. Seymour
Research Manager
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Dow Chemical Company

Selected Excerpts from
"Detroit gets set for the HDPE gas tank --
and this time it's for real"
Modern Plastics July, 1972

"Probably the most significant development is the discovery of low-cost ways to remedy HDPE's relative permeability to gasoline --- Dow Chemical Company's patented (U.S. Patent 3,613,957) surface treatment of the tank interior.

"The Dow system--involving a license fee of roughly 1¢/lb. of product treated, and outlays in the $120,000 to $310,000 range for equipment--consists of a gaseous treatment involving the following three basic steps:

1) Ambient air inside the tank is purged with dry air by means of a "probe" inserted into the tank.

2) A chemical reaction (sulfonation) is induced via the probe with SO_3 gas, forming sulfonic groups that become an integral part of tank wall to a depth of several mils. These groups are then neutralized with aqueous ammonia.

3) The products of neutralization, chiefly ammonium sulfate, are washed away.

"According to Dow, the treatment lasts the life of the tank, has no effect on physical properties, and improved chemical resistance on prolonged exposure to gasoline or diesel fuel. Permeation rate reduction is claimed to be over 99%. For example, an untreated HDPE unit that evidenced 0.759 g./day loss at 70° F. had this figure cut to 0.002 g./day after treatment. At 120° F. the figures were 6.316 and 0.026 g./day for the untreated and treated units, respectively. The cycle time involved is 4 to 5 min. from start to finished tank, and the cost is typically in the 20 to 30¢ range for a 25-gal. tank."

(For further information on this subject, readers may wish to write for the brochure "Dow Surface Treatment Gasoline barrier improvement for HDPE fuel tanks" from the Dow Chemical Co. - Ed.)

January 2, 1973

Dear Mr. Wymer:

I received a draft of the proceedings from Panel #6, Pressurized Cans, at the recent New Orleans meeting. I have one comment to make about the text as it appears on page 3 of the summary. It would be much fairer to say that modification of the construction of the can dome has been made rather than "is being studied." You can see from the attached brochure this safety device has been announced to the trade and is readily available in all sizes.

Yours truly,

Russ V. Bradley
Manager, Product Development
American Can Company

RVR AEROSOL

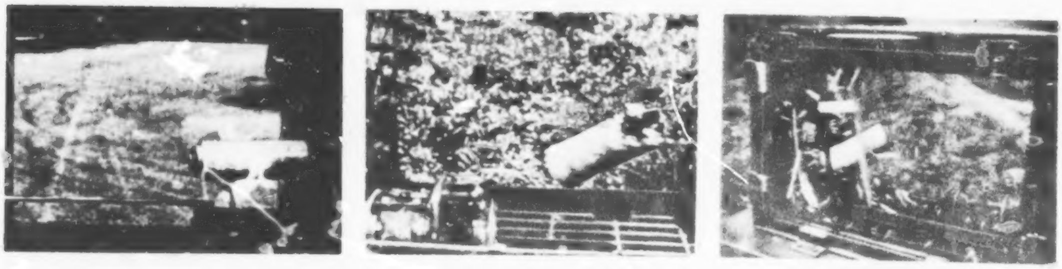
The Creative Approach to Package Safety

You've seen the syndicated editorial: *"Canned Danger"*. And the news items that variously report aerosol containers as being *"Explosion Hazards"* and the subject of interest to *"Government-Industry Groups Investigating Aerosol Safety"*. Put it all together and you have a barrage of news releases hammering away at the industry.

But, look closely. The underlying message is always the same: Unsafe packaging invites editorial attack! And, notice who is in the direct line of fire: Just about every Aerosol Packager.

Whether deserved or not, the editorial criticism hurts. On the other hand, creative developments in the field of product safety invite nothing but approval and praise. This is the reason [redacted] introduced the RVR* Aerosol construction earlier this year. With what results? — Government officials and opinion makers in the Industry have been unanimous in hailing the RVR* Aerosol as a major step forward in the field of product safety.

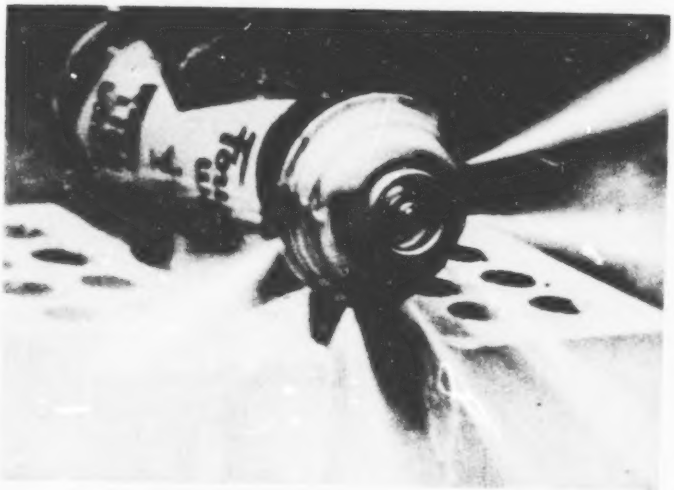
*RVR (Rim-Vent-Release)



The old way. Excessive internal pressures are most often created by overheating. These pressures can result in explosions similar to those shown in these scenes taken from a documentary film. The explosions are violent and hazardous. Thus the editorial attack. Product Safety is the issue.

the Safer Aerosol

RIM VENT RELEASE



This close-up shows you how it is done. Because the RVR* Aerosol is radially scored for maximum safety, the container contents are harmlessly vented.

The First Aerosol Container —

specifically designed to vent its contents before dangerous internal pressure levels are reached.

radially scored on its top double seam with multiple Pressure Release Vents.

built to vent under conditions of excess pressure or even when mis-use causes an excessive build-up of internal pressures.

How it Works: When internal pressure is raised beyond reasonable limits, the scored points open and vent contents at pre-determined rates. The venting action prevents bursting and dangerous flight of container parts. And, a strong point of the construction, the scoring operation does not impair the strength of the top under normal operating conditions.

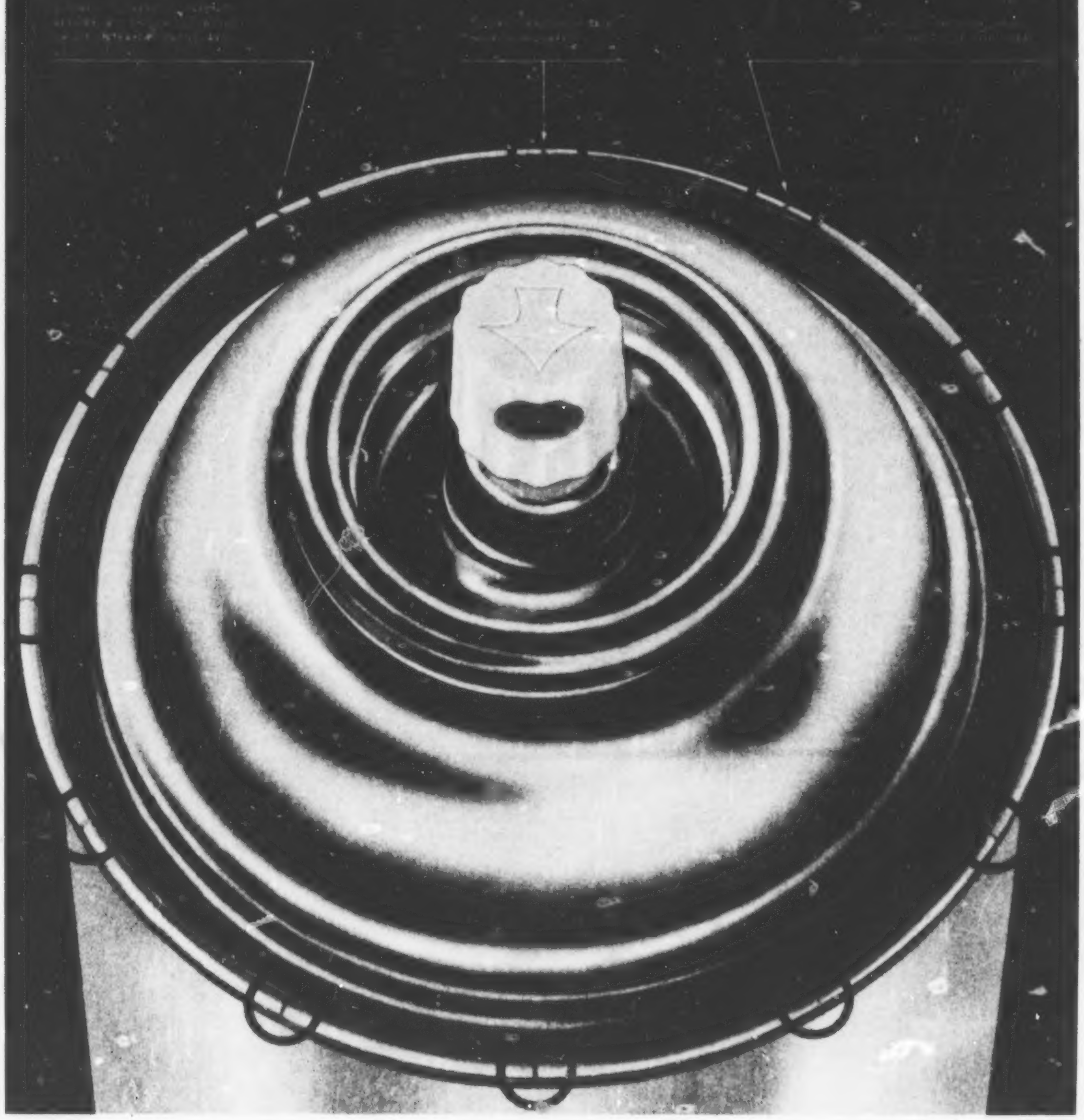
The Rim Vent Release container represents a timely achievement in this day of the enlightened consumer. It will be used as an *added safeguard*, not as a substitute for caution. All aerosol containers are still to be used in accordance with the product manufacturer's instructions printed on the container label:

Caution: Do not puncture or incinerate.

Caution: Contents under pressure.

Caution: Do not use or store near heat or flames.

Caution: Do not keep where temperature is 120 degree F. or over. Container may burst.



U.S. Department of Transportation
Federal Highway Administration
Washington, D.C. 20591

In Reply Refer to:
MC-10

Outline of speech given by J. R. Shelton, Deputy Chief, Compliance Division, to National Conference on Protective Clothing and Safety Equipment for Pesticide Workers, May 1 and 2, 1972, Atlanta, Georgia.

A. Brief history of Federal Highway Administration's Bureau of Motor Carrier Safety from Interstate Commerce Commission to current Department of Transportation program on hazardous materials.

B. Ten Regional Offices and field staff duties with relation to mission and responsibilities.

C. Jurisdiction as to Code of Federal Regulations, Title 49, Parts 173 and 177, in the shipment and highway movement of Class B poison pesticides.

D. Educational program now being carried out by Regional Hazardous Materials Specialists regarding pesticide transportation regulations, for local governmental emergency responding personnel in law enforcement and fire fighting agencies.

E. Brief coverage of pass-out material, consisting of all regulations relating to shipping and transporting Class B poison pesticides.

F. Brief history of highway accident experience involving Class B poison pesticides in United States and Mexico.

G. Question and Answer period (entire group participation).

COLOR-CODING CONTAINERS
OF HIGHLY TOXIC PESTICIDES

September 13, 1972

"Dear Sir:

"Thank you for your letter of August 16, 1972, in which you requested information on color-coding of pesticide packaging as discussed by the Safety Panel of the Federal Working Group on Pest Management.

"This subject has come up at Panel meetings several times, and I can provide you with a general assessment that would cover most of the discussions:

> The idea is an excellent one, in that it would readily identify - even at fairly great (and safe) distance those pesticide products that are highly hazardous. Such coloring of these containers alert personnel who are handling the products or other material near these products. Thus, personnel could exercise the necessary handling care, avoidance, and separation that may be required for such products. And they can do so without reading labels or attempting to interpret signs or symbols. This is especially helpful if a spill or leakage has occurred, and personnel must assess the situation and plan clean-up and corrective procedures at a safe distance.
>
> The complication, however, exists in the fact that product labels, normal package colors, and container colors are presently widely variable in colors and coverage. Company identification and attractiveness of labeling play an important role in the success of merchandizing products. Also, proper colors and color contrasts for identifiable printing and safety symbols and statements must be maintained. With the wide variety of colors already in use, a suggestion or requirement of a single color to signify highly hazardous pesticide products would immediately be become a needlessly complex operation.

"In conclusion, therefore, and in recognition of the valuable assistance color-coding can provide, we have registered our present assessment of such suggestions as follows:

> Color-coding of containers of pesticides according to hazard could readily be undertaken within a single organization (i.e. Dept. of Defense, General Services Administration, etc.). Under such an arrangement, the single organization can determine the colors and manner of coloration of packaging that would fit most readily in its present scheme. All personnel within that organization can then be alerted as to what a certain color(s) stand for. This allows the organization to determine which product(s) require color-coding and how extensive the color-coding should be. It permits them to extend color-coding beyond pesticides and to include other hazardous chemicals.

"Obviously such a system benefits only those personnel within or familiar with a single organization, and this is somewhat limited protection. Yet we can safely say that these personnel are most likely of all to be handling such products, and handling them in rather great quantities. Therefore, a step in this direction by individual organizations that manufacture and handle highly toxic chemicals would be beneficial in our opinion, and we intend to encourage it.

"I hope this appraisal of the color-coding system is helpful to you."

/s/ W. H. Preston, Jr.

(This is a copy of the most recent reply to the frequently-suggested and much-discussed color-coding system for pesticide containers - Ed.)

SAFETY PANEL COMMENTS ON A DOD PROPOSAL FOR MARKING OF PESTICIDE CONTAINERS

From a discussion at the meeting of September 24, 1971

1. Background - Summarized, the proposal recommended embossing 55-and 5-gallon pesticide containers with a skull-and crossbones symbol, painting the containers a safety yellow color, and painting the embossed symbol black.

2. Previous comments - Discussions of the Panel and its Container Task Group had previously touched on these considerations. These comments are summarized as follows:

a. The Manufacturing Chemicals Association had taken a strong stand against the Mil-Standard 1341 (SA), 20 June 1969, Sumbols for Packages and Containers for Hazardous Industrial Chemicals and Materials, mainly because of its complicated requirements. All agreed that the Mil-Standard was too complicated.

b. There is a U.N. labeling study going on to develop labels for international use, and the Department of Transportation has a proposed hazard information system for use in labeling hazardous materials. These two systems would have to be considered in any labeling or marking considerations.

c. The agricultural chemical industry has not opposed color coding but recommended that any type of color coding should be given alot of study.

3. Specific comments on proposal - Discussions of the Panel in reviewing and considering the DOD proposal are summarized as follows:

a. Some panel members felt that 55-gallon drums should not have any more embossing on them than at present. Also, concern was expressed on whether cooperage firms would accept embossed containers for reclaiming.

b. Some members felt that use of skull and crossbones on all pesticide containers would tend to weaken the use of the symbol on Class B or highly toxic products. Skull and crossbones should be limited to Class B; however, the word "Pesticide" could be painted on the drum for those pesticides less toxic than Class B as this word is now well known. The skull and crossbones is recognized in this country as on a poison container, but it is not always so recognized in other countries.

c. Some members felt that pesticides should not be singled out as a group. However, there is a difference in Class B products which are pesticides. Most Class B poisons which are not pesticides are shipped between companies. Class B pesticides, while also being shipped between companies, tend to go to users to a very much greater extent and provide more opportunity for exposure and mistakes.

d. Some members felt that any standard color for pesticide containers used in the commercial market might be objectionable because many manufacturers and formulators use colors to identify their products or for other special identity or use purposes peculiar to their production. This would also tend to put all pesticides in the same category regardless of hazard, i.e., parathion vs. malathion, DDT vs. synergized pyrethrum. Some identification could be put on, to aid handlers, in a manner not to interfere with company color or design, such as orange stripe or some other color.

e. This may be a singular problem with DOD because of their black lettered labeling on dark olive-drab containers in many instances. Corrections could be done through procurement specifications, either requiring a colored container, color coding the container with an identifying stripe or larger and more legible labels.

f. Problems can be foreseen in getting this suggestion adopted for all federal agencies and in the commercial market because considerations and obstacles such as ICC regulations, different formulations, colorblind people, proposed international color coding, etc. would have to be explored and resolved.

4. Consensus - The consensus of the Panel was that:

a. Requiring pesticide drums in DOD to be painted a safety yellow with black markings would be a marked improvement over the olive-drab color with black markings.

b. Recognizing that the DOD representative would take into account the above comments of the Panel and adjust his proposal accordingly, the Panel supports him in his presentation of the proposal to DOD and desires to recognize its value.

c. If successful within DOD, the Panel would want a report so that the proposal's future beyond DOD could be assessed.

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